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WORK AND ADVENTURES OF THE NORTHERN PARTY OF CAPTAIN SCOTT'S ANTARCTIC EXPEDITION, 1910-1913.*

By RAYMOND E. PRIESTLEY.

Captain Scott had intended from the beginning of his preparations to have a separate and smaller scientific party to attempt to explore King Edward's Land, and thus the Eastern Party came into existence. The name of the party was afterwards altered in consequence of change of position of their wintering station with regard to the home base.

On January 20, 1912, we said good-bye to the Southern Depôt party, and on the 27th the *Terra Nova* left McMurdo sound on her cruise to find us a home. The attempt to reach King Edward's Land was a failure owing to the presence of much heavy pack to the east of Cape Colbeck. We were finally compelled to abandon any hope of exploring this region when, on February 3, the *Terra Nova* steamed into the Bay of Whales and found the *Fram* moored to the sea ice and Amundsen already established in winter quarters there.

It was finally decided that we should adapt Borchgrevink's old winter quarters at Cape Adare to our use, and our stores were accordingly landed there, and in a little over twenty-four hours we had said good-bye to the ship's party and the *Terra Nova* had sailed for home.

The winter passed much as every winter does in the Antarctic. There was a certain amount of work for all hands, just enough to keep every one contented, and certainly from the point of view of beauty Cape Adare would be hard to beat as a place of residence. Immediately opposite to us the Admiralty range towered to the height of 12,000 feet in Mounts Sabine,

* Royal Geographical Society, November 10, 1913. Map, p. 116.

Minto, and Adam, and from between the snowclad peaks of the nearer mountains steep and much-crevassed glaciers fell sharply to the sea. At the back of the hut Cape Adare rose to a height of 4500 feet, the black and red of its basalt contrasting sharply with the white of the snowdrifts which seamed its top and sides.

During the late autumn, before the sea ice set in finally, a magnificent swell beat on the northern shore of the beach, hurling large boulders of ice many yards up the sloping shores. That and the sea which broke on the southern edge of the beach during the blizzards which marked the period of the decline of the sun formed an icefoot of intricate formation which was in itself a perfect gallery of beauty.

In view of what happened next year, perhaps the most interesting feature of the first winter was that we lived much more on the country than had been proposed, for directly we arrived Campbell and Levick had condemned our mutton, and after this we relied entirely on seal and penguin for our fresh meat. I think it likely that that fact assisted us materially during the next year, when, for a time, our diet was for all practical purposes restricted to those two animals.

Directly the sun returned in the early spring our sledging season opened, and on July 28 Lieut. Campbell, Abbott, and myself left on a preliminary journey to the back of Robertson bay. This was the beginning of a series of sledge trips which totalled up in my case to nine weeks, all of which, except the last fortnight, may be classed as spring and winter sledging.

The chief results of these journeys were a new and accurate survey of Robertson bay, the collection of a large amount of geological and glaciological data, and the discovery of a new meteorological province on the west side of Robertson bay. Here the proportion of calm days during the period under our observation was over 190 out of 200, while at Cape Adare during the same period we experienced several gales, one of which at least lasted for ten days at hurricane force.

Any extended geographical exploration was completely prevented by one of these gales, which, on August 16, broke away the sea ice in a line from the north end of Cape Adare to just north of Cape Barrow, the north-western extremity of Robertson bay. When in September we sledged past this point we found the sea ice utterly untrustworthy for many miles together; indeed, so thin was it that Campbell and I, when looking for a site for our camp opposite Cape Scott, were able to push our ski-sticks through it in several places. Just north of this a glacier tongue extended 15 miles out into the sea, and we could see no place within sight where it would be possible to camp on land. Campbell therefore decided that we had better turn back and confine our future attentions to Robertson bay.

During October and November, therefore, several sledge parties were despatched to different parts of the bay, and a good photographic record of all the coast as far as was practicable was obtained by Dr. Levick, while

geological specimens were collected by myself, and Campbell added detail to his map.

After the middle of November the bay ice itself was becoming unfit for sledge travelling, and from then on we were confined to Cape Adare itself. We spent most of our time photographing and studying the habits of the penguins and preparing for our expected relief by the ship at the beginning of January, when we were to be carried down the coast and landed to survey the country immediately round Wood bay.

One of the effects of our disappointments at Cape Adare was to drive home the fact that it was not safe for a sledge party in the Antarctic to undertake any extended coast journey without a boat of some type or other. This remains to our minds one of the axioms of Antarctic sledging, in spite of the fact that several journeys of 200 or 300 miles have been made by various parties. There has as yet been no serious accident, but this does not imply that the luck will not one day change, and one party of which I was a member has already spent an uncomfortable twenty-four hours adrift on a floe in the Ross sea. .This is the sort of thing that does not happen twice without a disaster.

Campbell, with his usual resource, contrived a substitute for a boat which on several occasions proved itself seaworthy, though fortunately it never had to be put to an extended test. This was a canvas covering made to fit tightly over a sledge. Another form was later devised of larger size, so as to give greater freeboard. In the latter "kayak" the canvas covering was made large enough to admit of the insertion of a rolled-up sleeping-bag at either end of the sledge, and in this case it proved possible for the occupants to stand up and walk about with ease, and the boat would have taken several hundred pounds of gear in addition to its crew. The canvas was then soaked in colza oil, and was thus made watertight. These boat covers, when rolled up, occupied very little space on the sledge, and weighed only fifteen to twenty pounds each. We all made several trips in these "kayaks," and found them very trustworthy. It might be possible, by following out these lines, to make a very safe and quite portable boat for sledge travelling, and this is a matter that might well occupy the attention of any future leader of an Antarctic expedition.

On January 4 the ship was sighted from our observation camp on the top of Cape Adare, and two days later, in spite of some trouble with the pack, we were all on board and steamed away south on our way to new ground. Pack again prevented Lieut. Pennell from landing us where we wished to go, and we were obliged to disembark in Terra Nova bay, a little north of the island whose shoreward edge forms the triple indentation which was discovered by the *Nimrod* when picking up Professor David's party, and was named by Shackleton Evans' coves.

This ends the summary of our first year's work, which I have purposely cut short in order to reserve the greater portion of the time allotted to me

to describe the unique experiences through which we passed during our second winter at Inexpressible island.* This has a special interest, as it is seldom that a party has been reduced in the Antarctic to primitive conditions for the greater part of a year, and is therefore useful as showing exactly how far men may rely on their power to keep themselves alive on the southern continent with the minimum of artificial help.

We had prepared a large depôt at Cape Adare which was to have been landed with us here, but it was necessary to sledge all our gear about half a mile over sea ice before it would have been possible to depôt it, and as Campbell did not wish to delay the ship, he decided to land only such spare food as could be taken in one journey by ourselves and a sledge party from the ship's crew. In the light of after events this proved to be a grave mistake, but it was one which I think any one would have made under the circumstances. We had no precedent for supposing that there would be any difficulty in picking us up as early in the season as was intended, and, indeed, we believed that, of all places on the coast of Victoria Land, this position in the lee of the Drygalski barrier was the most accessible. So, under the normal circumstances, it is, as was again proved by the ease with which the *Terra Nova* steamed in and out the following year when we picked up our specimens from the depôt at Hell's Gate.

From January 8 to February 15 we spent a very pleasant six weeks exploring the glaciers which coalesce to form the piedmont on which we landed. I think that, given ample time, it would not be difficult for a party to get down into Wood bay by way of the Boomerang glacier. This glacier, up which I took a rope party to within a couple of miles of where it debouches on an ice plain that may or may not be part of the Great Plateau, is a tributary of the Campbell † glacier. In the year we were there the glacier was so heavily snow-covered that it would have been a long and laborious business to reach the top with loaded sledges, and this task was quite beyond our powers in the time allowed to us. The district certainly ranks with the Granite harbour and the Ferrar-Taylor districts for interest, and it is a pity that Captain Scott's original plans were prevented from being carried out by the abnormal ice season, and so Griffith Taylor's and Debenham's party were unable to examine the environment of Mount Nansen, which we were compelled to leave for them by reason of our instructions.

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* When discussing what name to give to the island on which we spent such an uncomfortable winter, we had great difficulty in deciding on one which would at once express our feelings with regard to the island and also be permissible in modern literature. We passed in review through our minds all the names we could think of that had already been given in the Antarctic, and the name "Inaccessible island," given by Captain Scott to one of the Dellbridge islands in McMurdo sound, suggested the one that we finally adopted.

† This glacier was first seen by Prof. David on his journey to the Magnetic Pole. He gave it the name "Campbell" glacier in 1913, as a tribute to Lieut. Campbell's work during the present expedition.

SPEED TRIALS OF THE *ADÉLIE* AT CAPE ADARE.

CAMPBELL TESTING HIS IMPROVED MODEL OF SLEDGE-BOAT, *THE GREAT WESTERN*.

AFTER THE WINTER AT INEXPRESSIBLE ISLAND. ABBOTT, CAMPBELL, AND DICKASON.

PRIESTLEY, LEVICK, AND BROWNING.

On February 17 we were back at the Hell's Gate moraine, awaiting the return of the *Terra Nova*, and it was from that date that that particular part of the Earth commenced to justify the name which we subsequently gave to it. Until the 29th one almost continuous cold plateau gale swept across the piedmont, to be succeeded during the following winter by gale after gale nearly always from the same general direction, west-south-west to west-north-west, and with no single interval of calm exceeding twenty-four hours to break the monotony until we started down the coast on our final sledge journey on September 30. This continuous cold gale has to be experienced before its merciless power can be realized, and as I describe the next few months they will, I fear, lose much of their significance by my failure to conjure up the atmosphere of infernal, never-ending frost-biting wind.

On February 24 our sledging provisions were due to come to an end, with the exception of a few biscuits and a little pemmican. We had already, since the beginning of the gale, commenced to economize, and in the tent of my unit, Campbell, Dickason, and myself, we had been living on one meal a day; but it was evident that, in case of the attempt to relieve us failing, it was necessary to reorganize the distribution of the food. On the 23rd, Campbell asked me to take over the complete charge of the latter, and to take what steps I liked to reduce the ration with the idea of making our depôt last out until we were able to relieve ourselves. After some discussion we decided to make the problematical date of our starting south August 20, and I was to make the biscuits last out until then, and leave as much of biscuit, pemmican, chocolate, sugar, and cocoa as would give a month's provisions on half sledging rations for the journey. This left us, for the winter, 5 cases of biscuit, 18 pounds of chocolate, 28 pounds of sugar, a little tea saved from our recent sledging journey, and a few tins of cocoa.

The ration finally decided on took effect from March 17 till the end of August, and later on had to be slightly modified to make the food last out till the end of September, but with these slight exceptions the daily ration we lived on for the six months which followed was: alternately two and one biscuit a day; twelve, afterwards reduced to eight, lumps of sugar every Sunday; one stick of chocolate (1½ oz.) every Saturday and every alternate Wednesday; a few raisins on birthdays and the last day of each month; and three teaspoonsful of cocoa five days a week, three teaspoonsful of tea on Sundays, and either the leaves reboiled on Monday or hot water *solus*. Besides this we had about half as much seal and blubber as we needed. This shortage of food, although one of the most unpleasant features of the winter, was perhaps more of a blessing than struck us at the time. I am convinced that our good general health during the first half of the winter was largely due to the fact that we did not get overmuch of a diet which would have proved much too nourishing had we had as much bulk as our stomachs desired to satisfy their cravings.

On the 29th our long imprisonment in our tents ceased, and we were able to set about preparations for the winter.

Campbell's first step was to move our unit over to the shores of Inexpressible island. Here was situated the drift out of which we proposed to dig our future home. He left Levick, Abbott, and Browning encamped at the depôt, as from there they had a better view of the direction from which we hoped for relief. He gave them instructions to kill any seals they might see, to keep an occasional look-out at night, and to come over in the daytime to assist us at the cave.

It is fortunate that he was so prompt in his decision to start laying in a stock of seal and penguin-meat, for, although during the early summer Evans Coves are swarming with seals, it was already so late that we only secured the minimum number necessary to tide us over the winter, and the majority of the penguins had already finished their autumn moult and left for more hospitable climes.

In all we succeeded, before the winter set in, in securing fifteen seals and one hundred and twenty penguins, and, with the exception of five emperor penguins we added to our larder in early April, we saw no other life till towards the end of July, when our stock was practically exhausted.

While the attention of half the party was directed towards stocking our food depôts, the other three were engaged in tunnelling into the only drift of any size on Inexpressible island.

This work continued steadily until March 22, by which time the pick and shovel work was completed, and we were able to turn our attention to insulating the floors and wall and finishing off the walls of the tunnel. The model of the igloo at Earl's Court gives a very good idea of the result of our labours. A passage 10 yards or more long, and divided in the middle by a door of biscuit cases and snow blocks, gave access to the living-room proper, and at the same time by reducing the possibility of a draught added very much to the comfort, if not to the security, of our position. The door of the living-room was also composed of three biscuit cases, and the outer door of the passage, which gave us more trouble than anything owing to its liability to allow the entrance of drift, finally resolved itself into a raised hatch with a bamboo frame with the sack hung perpendicularly instead of horizontally as in our first attempts.

This last item provided us with work off and on till the end of August, and was until then never satisfactory.

The living-room was lined halfway up its height on all sides, except immediately opposite the fireplace, with snow blocks cut out of the softer portion of the drift and about 12 by 9 by 30 inches in size. We had originally intended to complete the snow-block wall to meet the roof on all sides, but before it reached the necessary height we found the insulation of the hut sufficient to make it habitable, and as we appreciated the value of the partial wall as a shelf it was never finished.

In one corner of the hut a shallow trench a yard square was dug, and

this was paved with eight large flattish boulders and was used as a fireplace. This acted excellently until the end of August, by which time the ice formed from the drips from the walls and ceiling of the fireplace had overflowed the granite boulders, and the cook of the day frequently had to remove his fire in order to bale out the fireplace, while if the stove was left in place long after the fire had been put out it had to be chipped out of the fireplace with an ice-axe.

Our chief triumph over discomfort, however, proved to be the floor. Providentially the beach which fringed the particular cove we were encamped in was lined above high-water mark with large quantities of seaweed which had probably been washed up when some easterly gale or gales had banked up the waters of the bay. We found that a layer of this several inches deep not only gave us as comfortable a mattress as we could wish, but also added 50 per cent. to the warmth of the hut. I think that the first day I felt there really was a good prospect of pulling through was the day I first got into my bag with a hard day's work behind me and found that this seaweed flooring far exceeded all our most sanguine hopes. It certainly was the most comfortable night I had spent since early in February.

Ventilation was another problem we did not overcome until late in the winter. When first built, the hut had no chimney at all, and for some time we were very chary of weakening the roof by boring a hole in it. All the smoke from the blubber stove had to meander out at a height of about 2½ feet from the ground, and it was only possible to exist inside by carefully refraining from lifting one's head above this height. As for the poor cook, he stood it as long as he could, and would rush out into the passage every few minutes and cough his heart up, and then return and give his mate a chance to get a breath of fresh air. After a week or two of this, it was unanimously decided that a chimney must be made, and as practical hutbuilder, I picked one out according to a joint design. This chimney, which was easily plugged at first by a small piece of penguin-skin, ablated so steadily during the winter that finally one of the messman's most unpleasant duties was the endeavour to plug it up with a wad of refuse, which was as much as he could lift and full of grease, and "Placing the Plug" has been immortalized in song and diary as one of the most strenuous of Antarctic exercises.

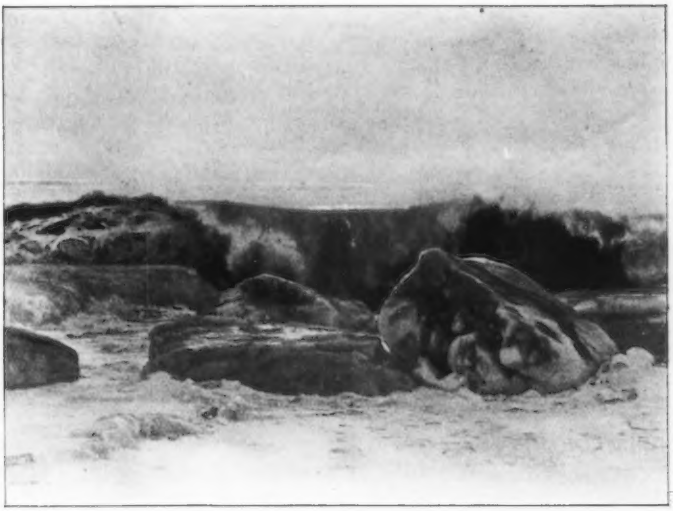
During the early days of the chimney, it was satisfactory except on the rare occasions when a drift-bearing wind blew from the south-east. Then ventilation became a farce, both chimney and shaft were blocked up, and on two occasions at least we were as near asphyxiation as I ever care to be. On one occasion, stove, lamps, and fire went out; the primus followed, and when Dickason tried to light the primus with a match the match-head glowed but refused to fire.

After this, whenever the drift was bad, we kept watch and watch for two hours each during the night, and never allowed the blubber reading-lamps to go out.

The question of light was one of the problems that caused us most anxiety before we began to experiment seriously, and yet was perhaps the most easily conquered of all. I well remember the inception of the first blubber lamp. It had been one of the early miserable days before we settled down for the winter, and we had all day been toiling hither and thither transporting food and blubber from the scene of the kill to the depôts. The work was carrying heavy loads over huge boulders and in a biting wind which was so gusty that one had to be on the *qui vive* the whole time, and even then as often as one was hurled backward in a gust one fell forward in a lull. Dickason had been left behind that day to look after the tent, which was so torn we were afraid of losing it, and when Campbell and I arrived tired out with our struggle with the wind, he produced some titbits of blubber he had fried for us, and, what raised our spirits much more, he showed us the first reading-lamp—an Oxo tin full of blubber, with a wick made from a strand of the binding of one of his finneskoe. It burned beautifully with a small but quite clear flame, and one of our greatest prospective difficulties was overcome. These lamps, with some slight changes, such as the substitution of a tin bridge for the safety-pin which had supported the wick, were our only sources of illumination during the winter that followed.

More important, and a far longer process, was the evolution of a blubber stove for cooking. It was early apparent that our oil, though far in excess of our other stores, would not stand the cooking of even one meal a day at half ration. In consequence of this we began our experiments seriously as soon as we moved into our cave, being deterred from burning blubber in the tents for fear of having them burnt over our heads. The earliest method again proved most satisfactory in the long run, and nothing beat our first simple stove made from the lower portion of a one-gallon oil tin with flanges left an inch or two higher on which to stand the aluminium cooker. At first we tried burning the refined oil by itself, endeavouring by turns to cook the dinner and try out the oil over the same fire. This proved unsatisfactory, and a second fire was instituted solely for the purpose of frying blubber and trying out the oil for the cooking fire and reading-lamps.

The next advance lay in the multiplication of wicks, but this again proved of little use: either there was no fire or, if the oil got low and became hot, there was too much fire, and at times, when we forgot for the moment that our house was made of ice, we began to fear that it would be burnt over our heads. Finally Levick hit on the great idea of using old dried seal-bones, of which there were large numbers on the beach, as fire bricks on which to burn the oil. This proved a huge success, and when pieces of blubber were stuck on the end of a marlinspike projecting over the stove, our latest fire became almost self-supporting, and it proved an easy job for the cooks to try out enough oil for the reading-lamps, cook the evening meal, and melt the water for the next morning's meal during his hours of



SURF BREAKING ON THE NORTH BEACH AT CAPE ADARE.

BOULDERS HURLED MANY YARDS UP THE SLOPING BEACH BY THE WAVES.

FOSSIL WOOD FROM THE PRIESTLEY GLACIER.

IMPRESSION OF A BRANCH FROM THE PRIESTLEY GLACIER.

duty from 11 a.m. to 6.30 p.m. Thus it will be seen that our whole attention during the months of April, May, and part of June was fully occupied with perfecting details of domestic economy, so that we never had much time to think of anything outside our own position.

Let me try to describe what a day's work meant to us in those early weeks. Two men were told off respectively as cook and messman, and it was their duty to carry out all the domestic routine for their "day on." Their task was to cook and prepare our meals. This sounds little enough, but imagine the hut imperfectly lighted by two blubber lamps each of one match-power or less. In this "darkness made visible" the pioneer messman had to squat on the floor and chip meat off the partially-butchered carcase of a seal with the help of my geological hammer and chisel. He had then to grope about for the scraps over the greasy seal-skin that paved our threshold. I do not even now like to think of the miscellaneous assortment of filth which must have found its way into our hoosh in those early days.

In addition to the discomfort caused by the absence of light, the mess-man suffered severely from the cold, for he was compelled to sit in the draught from the door. It is a fact that in the later days when the meat was thawed in the "oven" to the consistency of cheese and could be cut with a knife, it was a common thing for the messman to cut his hand and not know he was not cutting seal meat until he saw the blood.

These are only a sample of the difficulties which made preparing two meals an unusually hard and wearing day's work. The chief trouble of the cook was caused by the fumes from the fractional distillation of the blubber oil used in the cooking stove. These caused acute irritation and inflammation of the eyes and nose, and occasionally the messman would have to go to the relief of the cook and tend the fire, while the latter sat with his eyes closed and the tears streaming down his face, endeavouring to shape in his mind some expression worthy to give vent to his feelings. The remaining four men tackled the out-of-door work for the day, and their chief troubles were the wind, and the traverse of the huge boulders between the shore and the drift. Once the wind had upset you during this passage, the load you were carrying—joints of meat, penguins, or a hundredweight or so of blubber—successfully held you down until you had recovered your breath and lost your temper. Usually one's temper remained lost even when one's balance was recovered.

Butchering a seal, again, was no comfort in draughty wind-clothes and temperatures well below zero, and the numbness of our hands was the cause of many cuts. Abbott on one occasion severed the tendons, and lost the use of three fingers through a combination of blunt knife and tough seal-hide.

Perhaps the worst time of all, however, until the month of sickness towards the end of the winter, was the first month we spent in our thread-bare tents exposed to the incessant fury of the equinoctial gales. Our

tents were patched in many places, and were threadbare at the seams; our bags were beginning to show signs of wear also, and were letting in the draught at several places; and we were ill-fed and weak, and had on clothes which were only intended for summer sledging. We were in a very bad way for a party about to commence a struggle for existence under adverse conditions, and our discomfort culminated on March 18, the day after Campbell, Dickason, and myself had moved into the snow cave.

On that day Levick's party had their tent-poles smashed over their heads in a particularly violent gust, and were obliged to pile stones on their gear and come over to the cave without their sleeping-bags. The night that followed is, I think, another of the things we shall never forget.

The next trouble to take us by the throat was one which we never had a hope of overcoming. We had always been hungry since we were on half rations, but about the end of April the desire for more and different food became painful, and this pain became progressively worse until the close of the winter, when seals once more began to appear. The trouble was twofold: one craving was for more abundant food, and was in a measure satisfied when towards the end of August two seals were killed and I was able to increase the ration. After this date we were never short of sea meat again, and were able to eat our fill. The other craving was, however, in my opinion far worse, and was never satisfied until we broached Griffith Taylor's depôt at Cape Roberts. This was the craving for a change of food, and this, more than anything else, was, in Browning's case, within an ace of becoming a matter of life and death. We tried various methods of flavouring our food, some with much success, others with none at all. The medical comforts were brought into requisition, and citric acid tabloids in our hot water drink on Tuesdays were a great success, but ginger tabloids in the hoosh proved useless, and a mustard plaister left behind it only a pervading taste of linseed. Besides these official attempts, on two occasions at least, to the disgust of the company, the messman for the day unofficially flavoured the hoosh, needless to say by accident. The first was when Campbell lost two feet of tarred rope that he was using as a spill, and this made a very pronounced creosote hoosh; and the other was when Abbott forgot to remove the penguin flipper with which he was cleaning out the pot, and incidentally forgot to remove the scrapings also. It is remarkable what a lot of flavour can be got out of a penguin's flipper by stewing it for half an hour.

At different times I suppose Campbell, Abbott, and Levick consumed in their hoosh quite a large quantity of the dried seaweed that strewed the beach, but it had been so long on the beach and so trodden on by penguins that I never permitted its inclusion in the regular ration. The only two really successful variants we were able to use were the meal of fish from a seal's stomach, which was the most savoury of all meals we had in the ten months, and seal's brain, which did not taste at

all like seal, and gave the hoosh a strong flavour approaching that of cereals.

In any discussion of our food it should be mentioned that our supply of salt ran out before the end of March, and that after this we were obliged to have recourse to sea-water and sea ice. This innovation at first caused acute attacks of diarrhœa to the majority of the party, but, except in the case of Browning, who towards the end of the winter became so bad that he was obliged to make his own hoosh with fresh water, we all soon recovered from this; and in the case of the unit to which I was attached, we grew to like the flavour so much that even when we had picked up Griffith Taylor's depôt we still used sea-water in our hoosh in preference to Cerebos salt.

Every Saturday evening we held a singsong, when every man participated to the best of his ability. On Sundays we managed to rake together at least a dozen hymns and a couple of psalms, and Campbell read us a chapter of the New Testament, of which we had a pocket edition. The other three books we possessed, 'David Copperfield,' 'Simon the Jester,' and Balfour's 'Life of Stevenson,' were successively read, one chapter a night, by Levick. Every subject of conversation we had was thrashed out again and again till it was pretty well threadbare, and the only things we were careful to avoid were any arguments on questions which either of us had much at heart.

Towards the end of August ptomaine poisoning made its appearance, and for the first time since the tent days depression temporarily settled on the party. Every one except Campbell developed severe diarrhœa, and we all became rapidly weaker. It was three or four days before we were able to settle with any certainty on the causes of this epidemic. The seal's liver we had been eating immediately before the outbreak was undoubtedly strong tasting, though we could not see any reason why it should be so unless the seal was diseased. The main cause of the trouble, however, we believe now to have been undoubtedly the filthy condition of the biscuit-tin we had been using to thaw out the joints over the blubber fire. From the very beginning of the winter it had proved impossible to keep clean either ourselves or the cooking utensils we used. As a rule one penguin was cut up every day for the morning's hoosh, and the skin of this beast was the messman's and cook's perquisite, but was usually so encrusted with smoke from the fires as to be of very little use. The blubber and the blubber smoke saturated and clogged everything, including the joints of meat in the warming tin or "oven," as we called it. This "oven" gradually got dirtier and dirtier through this and through the oozing of blood and snow water from the joints, and in the bottom of the tin a choice collection of bacteria must have been breeding, and the ptomaines they formed were taken into the hoosh on the seal meat. Fortunately, after a week or ten days' illness we got fresh seals and a fresh biscuit tin, and so were able to do away with the tainted meat and

"oven." Almost immediately the disease lost its grip, and in a week or so all of us except Dickason and Browning were none the worse but for the weakness it left in its train. Dickason was still suffering until the return to half sledging-ration fortified him enough to resist the poison, and Browning, as I have already mentioned, was not well for weeks, but it is of course difficult to say in his case when his attack of poisoning ceased, as it was superimposed on his original trouble.

Soon after Midwinter Day Campbell decided to start down the coast much later than he had intended, and accordingly for the whole of July I was obliged to knock off the biscuit ration so that we should be able to have one biscuit a day during the month immediately before the commencement of the sledging journey. This ptomaine poisoning and the consequent weakness delayed the start still more. During August we were reduced entirely to a meat diet, and for the whole of September our ration outside meat was reduced to one biscuit a day and no luxuries. In spite of these deprivations, we soon picked up strength on the full ration of seal meat and blubber, and were fortunate enough to get several more emperors, thus making our hoosh more appetizing. During this last month Levick put us through a course of Swedish exercises every day, and this proved of inestimable value, for, besides strengthening us generally, it took the curve which we knew as the "igloo back" out of our spines. This "igloo back" was caused by the constant stooping to adapt ourselves to a house which was nowhere over 5 feet 6 inches high, and where it was impossible ever to stand upright. All through the winter Levick's care of our health had been assiduous, and Browning in particular undoubtedly owes his life to this attention.

On August 10, according to Campbell's calculations, the sun was due to return, and by climbing the ridge in the lee of which was the drift we had made our home he did catch sight of it for a few minutes on the 13th. The rest of us did not see him until the 20th, for the wind was, as usual, too strong to permit of our going out more than was actually necessary. Our excursions during the whole of the winter were limited, with the exception of a few short turns up and down a lake near the cave, to trips down to the icefoot for seal meat, penguins, blubber, bones, and seaweed, and to our depôt on the Hell's Gate piedmont for oil and bamboos for roofing the shaft.

Towards the end of September four of us were feeling quite fit, and there seemed no prospect of improvement in Dickason and Browning, so that Campbell decided to start down the coast in an attempt to reach Cape Evans. We were fortunately favoured with fine weather while making our preparations to leave, for, although the wind still blew, it was much reduced in force, and work out-of-doors was more bearable than it had been since the previous summer.

From each seal we had killed during the winter I had put aside 20 or 30 pounds of the undercut, which we cut up during the last few weeks of

our stay in the igloo into cubes about half an inch in section. We prepared eight bags, four for each unit, each bag containing forty-two mugs of this meat and being a week's ration for three men. We proposed to have breakfast and dinner and a piece of raw blubber and meat for lunch. This routine was carried out until we broached the Cape Robert's depôt, with the single exception that once past the Drygalski, when we found we were able to travel down on the sea ice, we spared enough oil to lightly cook the lunch steak and blubber with the morning's hoosh. In addition to the meat, we also had, as I have already mentioned earlier in the narrative, half rations for one month of biscuit, pemmican, sugar, and cocoa.

The initial stage of the journey was across the Drygalski Barrier tongue, which Professor David had given such a bad character that it had loomed largely in our imaginations all the winter as a most formidable obstacle. This proved, however, not nearly so bad as it had been painted, or rather we must have struck a good route over the Barrier, for, with the exception of one quite well-bridged crevasse 170 paces across and several barrancas or steep ice waves some 50 feet from crest to trough, we had little trouble, and made quite a respectable pace across the ice until, on October 10, we sighted Mount Erebus from its southern edge. The sight of that old friend put new life into all of us, and, although we had some very heavy pulling through intricate pressure ice before we had left the Nordenskiöld behind us and had reached what might be called the home stretch, we had only to glance to the southward and see the well-known form of the most historic Antarctic mountain to feel that the hard work was not in vain, but that we were really approaching comfort once more.

By the time we reached Granite harbour, Browning's condition was causing us grave anxiety, nothing Levick could do seemed to cause him any relief, and we were compelled to increase his cereal ration at the expense of our own. His troubles, too, were soon to end, however, for on October 28 we sighted the flagstaff which marked the site of the Western Party's depôt, and from the time we broached that cairn the Northern Party's privations were at an end. If there is anything in telepathy, Griffith Taylor and his men must have slept easily indeed that night, for surely no one was ever more grateful than we were for this food. In addition to our first full meal for nearly nine months, we received, through Griff's letter to Lieut. Pennell, news of the safety of the ship, and so were relieved of the ever-present anxiety lest she should have met disaster through the *détour* she had made to land us at Evans coves.

The rest of the journey now resolved itself into a mere "depôt crawl," for in the 70 miles remaining we picked up two depôts, one at Cape Bernacchi, also left by the Western Party, and one colossal one at Butter Point, which had been laid by the ship, and our spirits remained steadily up until the news we received at Hut Point threw us completely off our balance and we knew ourselves for what we were: six men very tired and worn out and fit for nothing much but a good rest.

This ends the history of the Northern Party as a separate unit. It will be recognized by all of you that it is not really my place to set this story before you, but Commander Campbell was unable to do so. This does, however, give me an opportunity to place on record the debt that we of the Northern Party owe to him for his unfailing cheerfulness and fertility of resource, which went far towards bringing the party through a winter which is almost without parallel in the history of Antarctic exploration.

The PRESIDENT (before the paper): We will now turn from the presentation * to the main work of this evening. I should perhaps begin by recalling to your mind the incidents which we are about to hear narrated. Many of you, perhaps most of you, will have been present at the Albert Hall, at the great meeting last summer, when we heard the account of the whole expedition in its many ramifications, given to us in most moving and eloquent terms by Commander Evans, and on that occasion you will recall that mention was made of the remarkable achievement of the northern party—the men who, under Commander Campbell, were separated from their comrades and spent an entire winter in the ice and snow under conditions enough to test the courage and spirit of any man, conditions which they were enabled to surmount, partly by their own endurance and resource, partly by the intrepid example of their commander. It is the story of that party that Mr. Priestley is going to narrate to us at greater length this evening. Mr. Priestley's record is as follows: In 1907 he went out to join Sir Ernest Shackleton's Antarctic Expedition, and remained in the Antarctic till March 1909, his special work being in geology, meteorology, and biology. After his return he spent eighteen months in Sydney, helping to work out the Shackleton geological collections. He then joined Scott's second expedition, and, because of his previous experience in the Antarctic, was attached to the subsidiary party, of which I have spoken, and of which he was the junior officer in rank Besides his scientific work he had charge of the rations while the party lived under sledging conditions. Commander Campbell, the commander of the party, was also not without experience of ice and snow, which he had studied in Norway before he joined Scott's expedition. As a naval officer, he had served in the Mediterranean and Pacific, and had had experience in the merchant service before he joined the navy.

You will remember Scott was anxious to establish a station on King Edward VII. Land, at the other end of the Great Ice Barrier from McMurdo sound. This project failed owing to the state of the ice, and the party was diverted towards the northern coast of Victoria Land, the intention being to land as far north of Cape Adare as possible. It is the adventures of this party and the work it accomplished that Mr. Priestley will describe to-night. The party was under Commander Campbell, and besides Priestley it included Surgeon Murray Levick and Petty-officers Abbott, Browning, and Dickason.

Admiral Sir LEWIS BEAUMONT (after the paper): I am very glad indeed to be asked to bear testimony to the great interest of this paper. When we first heard of the safety of this party, I am sure it must have been an immense relief to everybody to think that the great catastrophe had not been greater still. You now know that their safety was due to the steady courage and

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* See *Geographical Journal*, December, 1913, p. 550.

good leadership of the commander, and to the way in which the whole of the party responded to him, kept up their spirits and never lost heart, and went through what is appropriately described by Mr. Priestley as one of the most extraordinary cases of getting through an Arctic winter without the proper provision for it—that is to say, in the most primitive condition. Such cases are not altogether unknown. For instance, there was the case of Major Greely, who led the American Expedition to the land where Captain Nares' expedition had but recently been. After they had wintered in Discovery bay for three years and while on their way south they lost their only boat and were compelled to pass that winter on Cape Sabine, where they could get no food and were reduced to great extremities, they lost several of their party, and were only relieved at the very last of their endurance and strength. That is one case. The other is that of Nansen. When he left the *Fram* on his celebrated voyage of drifting across the Polar basin, he left himself without any support. With his one companion he made his attempt on the Pole, but failing to reach it, turned round and tried to find refuge in Franz Josef Land. Nobody, I think, but Nansen could have done it; he reached it so late in the season, however, that they had to pass a winter there without anything but what they had with them on the sledge. Had it not been that the country abounded in bears they could not have lived. They actually lived on bear meat the whole time. So you see it has not been altogether unknown to pass a winter under primitive conditions, but in this case there is this difference, that there were six men; it is much more difficult in such circumstances to deal with six men. The responsibility must fall upon one man; if that man is not equal to the responsibility then it is very difficult indeed to supply his place, for he must remain the commander, and without a head and a commander it would go very hard with a party. So I think the interest in the story we have just heard lies in the fact that they passed through a polar winter keeping discipline, order, and themselves in an intelligent condition of mind, having their recreation, their instruction, and their physical exercises, and thereby showing what it is to be an organized party with a commander at the head of it. It is also an encouraging experience for any future expeditions that may land in the Antarctic. We shall have the feeling that even if it unfortunately happens that any party is separated from its base or depôt, it has a chance of living; for, as you now know, men can live upon seals and penguins. Commander Campbell most judiciously set aside the civilized provisions they had for their journey south, and lived almost entirely upon the resources of the land; having made a store of penguin and seal meat, they were able to keep themselves alive. It is rather interesting to know that in the instructions which Captain Scott left behind in England, with a view of guiding those who might have to send a relief expedition, and also with a view of allaying public anxiety on his account by making quite clear that he had no fear himself, he used these words, which I think are very significant: "In McMurdo sound exists, as is well known, an ample supply of seals and penguins, from which food, fuel, and clothing can be drawn for an indefinite number of years." That is to say, he had contemplated the possibility of their remaining in the Antarctic regions for more than three years, which was the length of time calculated to maintain them on the provisions they had taken, and he considered that even then it would not be a hopeless case, that with the seals and the penguins it would be possible to live for an "indefinite" (which perhaps was too encouraging a word to use) but certainly for a certain time, and this

party having lived as he contemplated and anticipated, is a proof of his foresight and an encouragement to all Arctic explorers who put their lives at stake for the sake of exploration and science. In that way, I think, we are quite authorized to take hope that in the future there will be no need to despair if men of courage and resource are separated from their party. The interest of the paper that has been read to-night lies in this fact: Commander Campbell's party had landed for a summer excursion, they suddenly found themselves left stranded, and had to make the best of what they had got, and did it most successfully, and under his leadership actually returned to the main depôt, very much to the credit of the whole party, but especially to that of the commander.

The PRESIDENT: Sir Lewis Beaumont has summarized with great ability the main characteristics of the expedition which has been described to-night, and the principal features of the paper to which we have listened with so much pleasure. Let me add two other points; the first was the extreme modesty that marked the narrative of the reader. You might almost think that he and his friends had gone through, I will not say an everyday experience, but certainly not an experience that placed a wholly exceptional and almost unparalleled strain upon the capacities of man. The second point was the very agreeable humour with which Mr. Priestley enlightened his story, and which must have been a powerful contributory factor to the cheerfulness of the party while they were in the igloo. Indeed, if Mr. Priestley regaled them with anything like the stories he told us, we can well conceive that the evenings must have been of an almost agreeable description. I ask you to join me in passing a vote of thanks, not merely to Mr. Priestley for his paper, but to all his comrades for the example they set. The tale that he has placed before us so modestly was a tale of courage almost beyond compare, of immense resourcefulness, and of indomitable endurance; and above all, let us congratulate him and ourselves that it was a tale not of death, but of life. May I say to him on behalf of you all, that we are proud of the record of these six gallant Englishmen, and that our tribute to him, in special reference to his paper, will we hope be passed on by him to his brave commander, and to the whole of the rest of the party?

SCOTT'S LAST EXPEDITION.*

IT was a wise decision to publish Captain Scott's diary by itself with nothing else in the volume. For it is on him and his companions, their splendid journeys and their heroic deaths, that the thoughts of his countrymen are concentrated. Captain Scott's devotion to duty, his inquiring mind, his ability in organizing work, and his warm appreciation of the zeal and good comradeship of his companions appear in every page of his journal. No class of men can value such qualities so thoroughly as

* 'Scott's Last Expedition.' In two volumes. Vol. 1 being the journals of Captain R. F. Scott, R.N., C.V.O.; vol. 2 being the reports of the journeys and the scientific work undertaken by Dr. E. A. Wilson and the surviving members of the expedition. Arranged by Leonard Huxley. Pp. xxvi., 693; xvi., 534. *Maps, Coloured Plates, Photogravure, and other Illustrations.* Smith, Elder & Co. 42s.

geographers. The whole story, as Scott tells it, has such unity, is so complete in itself, gradually increasing in interest and in pathos, that it reaches a grandeur such as is only found in the finest epic poems. Scott's last words will continue to live in the hearts of generations of his countrymen, as the last words of Sir Humphrey Gilbert have lived.

But we must remember that, with our lost hero, the work to be done was far more important than the workers. He was no self-seeker, no beater of records, but a true explorer with no thought save the work to be done and the welfare of his people. It was very characteristic of him to have written on the fly leaf of one of his note-books, a sentence from a work of Sir Francis Bacon—

> "But be the workmen what they may be,
> LET US SPEAK OF THE WORK."

Let us speak of the work, as Scott would have wished. In the *Discovery* expedition great discoveries were made, and most diligent and excellent scientific work was done. Yet Scott felt that much remained to be accomplished from his chosen base, especially in the examination of the great range of mountains he had discovered, and above all in such a finding of fossil remains as would throw some light on the unknown geological history of Antarctica. On this his heart was set. Instead of one geologist he took three, one of them with physiography as his special study; instead of one physicist he took two; instead of two zoologists he took three, besides one on board the ship; and he also got the services of a well-known and most skilful photographer. It was on the scientific work that he was so intent, though he also intended to reach the South Pole by a well-organized sledging journey. No polar exploring vessel was ever equipped for scientific observations, both as regards men and materials, as completely as the *Terra Nova*, and Scott's chosen base is the only place, either in the north or south polar regions, where meteorological, magnetic, and tidal observations have been taken for five years, admitting, to some extent, of generalization. Further work was done of great importance in deep-sea soundings, and in forming large biological collections, while the geologists made detailed surveys of several hundred miles of coast-line.

Captain Scott had decided upon reaching the South Pole, a distance of over 800 miles. This was more than could be done by men alone, and it was necessary that there should be other means of traction for the distance over the barrier. He obtained ponies and dogs from Siberia, and for the next season mules arrived from Tibet, working admirably, strong and hardy. Scott also gave much thought to the use of motor sledges, in the hope of being able to dispense to a large extent with the ponies and dogs, for he had a great dislike to their being overworked or underfed. He had considered, with the minutest care, all the equipments for sledge-travelling, and he was quite satisfied in his second expedition with the system of "sledge" travelling he created on board the *Discovery*.

The journey to the South Pole necessitated much careful calculation. In the autumn he was able to lay out a very large store of provisions well beyond Minna Bluff, which was called the "One Ton Depôt." On the long route thence to the South Pole he settled the points where depôts should be placed, the amount of each needful article in each depôt, and the measured quantity to be taken from each by each returning party. Three parties were to advance up the glacier, two limited ones, one to go to the head of the glacier, another to 87° 30′, enabling the extended party to reach the pole. It all worked out admirably on the journey out, and would have worked out as well on the return journey. A margin was allowed for delays caused by gales of wind or by accidents. There are risks in all polar journeys, if the accidents far exceed all possible precautions. With such a splendid organizer as Scott the risk was reduced to a minimum. "The causes of the disaster were not due to faulty organization, but to misfortune in all risks that had to be undertaken." That minimum increased by leaps and bounds, beginning to do so through the extraordinary exceptional and abnormal detentions by gales of wind, which had almost eaten away the margin of time allowed, during the outward journey. Worse troubles followed.

Nevertheless, the South Pole was reached, a magnificent achievement in the good old British way, men doing their own work. It was only an expanse of snow with the cold intense. In the return the margin disappeared and the collapse of Edgar Evans raised the danger signal. Other misfortunes followed, and the heroic leader had to tell a story of sufferings bravely borne, of hardships faced with courage and coolness, which has stirred the heart of every true Englishman. Yes! their dead bodies and Scott's rough notes have told the tale, a tale which will live in the hearts of Englishmen for generations yet unborn.

Yet, great as was the achievement of reaching the South Pole by the work of men alone, it was but a small part of the object of the expedition. Captain Scott and Dr. Wilson did by far their most useful scientific work on their way down the glacier, just as the dangers were beginning to gather round them. On February 8, they came down to the moraine under Mount Buckley, a far more important position than the South Pole on its barren uninteresting ice-cap. "The moraine was obviously so interesting that I determined to encamp and spend the rest of the day geologizing. We found ourselves under perpendicular cliffs of Beacon sandstone, weathering rapidly, and carrying veritable coal-seams." Dr. Wilson collected a number of fossils, beautifully traced leaves in layers, well-preserved impressions of thick stems showing cellular structure, and a good deal of pure white quartz. This was Scott's last cheerful entry. Altogether a weight of 35 lbs. of fossils was put on the sledge, a serious addition for worn-out men. Yet our gallant countrymen, knowing the great importance of the discovery, continued to drag the extra weight to the very last. It is a magnificent addition to our knowledge,

a contribution to geological science made, as it were, with their life's blood.

The second volume contains some interesting narratives. That of the winter journey to Cape Crozier, undertaken by Dr. Wilson, Bowers, and Cherry Garrard, is for pluck, endurance, and resolution a tale with few equals in polar annals. Lieut. Campbell relates his perilous journeys and wintering in the ice cave. Commander Evans has an account of the depôt journeys. Dr. Atkinson tells, in a simple and pathetic narrative, of the discovery and interment of the bodies. There are *résumés* of work done by the geologists, biologists, and physicists, giving us a foretaste of what is to be expected when the full results come to light.

C. R. M.

THE GEOGRAPHER AND HISTORY.

By ELLSWORTH HUNTINGTON.

The geographer is often disappointed because his fellow-workers, the historians, pay so little attention to results which he considers of fundamental importance. At the beginnings of their volumes the historians speak respectfully of the influence of geographical environment, but that is usually all. Thenceforth they become so impressed with the importance of economic considerations, or of purely human matters, such as ambition, religious ardour, mechanical invention, constructive statesmanship, or scientific, literary, and artistic achievement, that they feel that other subjects are scarcely worth considering. The location of a plain, to be sure, is mentioned as determining the site of a city, a defensible river-crossing is noted as causing a battle to occur at one spot rather than another, and a mineral product is recognized as the cause of the aggregation of a large manufacturing population. But, after all, what is the plain when weighed against the artistic impulse which spreads from the city and influences the world for generations? What is the river compared with the royal ambition which stirred up the bloody war wherein the battle is only a single incident? Or what is the mineral in contrast with the socialistic propaganda which spreads among the underpaid labourers in the factories? Why should the historian take time to expatiate on plains, rivers, and minerals when he cannot say a tithe of what he desires as to art, ambition, and socialism?

The geographer accepts the historians' view that these things are more important and, to most people, more interesting than plains, rivers, and minerals. He adds, however, that art, ambition, and socialism are the expression of human character, and human character is in many ways moulded by physical environment. Then he goes on to explain the faith that is in him, but his explanation has been marred by grave mistakes.

He believes that he has hold of a fundamental truth of the first magnitude; but, somehow, he has thus far failed to gain wide acceptance of his belief. Great numbers of people, to be sure, are ready nominally to accept his view, but for the actual application of it, he searches almost in vain.

The reason for this partial failure of the geographers is not far to seek. We have gone too far, and asserted too much, and in many cases it has seemed to our fellow-workers that we have failed to give due weight to intellectual, moral, and religious influences. Our beliefs may be true, but many of them require further demonstration. Two quotations will illustrate the matter. They seem to show that there are at least three chief lines along which our work needs to be strengthened. First, we must insist on greater *numerical exactness;* second, we must elucidate the action of *indirect* as well as direct geographical influences; and, third, we must emphasize the *selective* action of geographical environment. The first illustration is from the excellent article on Greece in the last edition of the 'Encyclopædia Britannica,' vol. 12, p. 426.

"The physical features of [Greece] played an important part in moulding the character of its inhabitants. Protected against foreign invasion by the mountain barriers, and to a great extent cut off from mutual intercourse except by sea, the ancient Greek communities developed a marked individuality and a strong sentiment of local patriotism; their inhabitants were both mountaineers and mariners; they possessed the love of country, the vigour and courage which are always found in highlanders, together with the spirit of adventure, the versatility and the passion for freedom characteristic of a seafaring people. The great variety of natural products as well as the facility of maritime communication tended to the early growth of commercial enterprise, while the peculiar beauty of the scenery, though little dwelt upon in ancient literature, undoubtedly quickened the poetic and artistic instincts of the race. The effects of physical environment are no less noticeable among the modern Greeks. The rural populations of Attica and Bœotia, though descended from Albanian colonists in the Middle Ages, display the same contrast in character which marked the inhabitants of those regions in ancient times."

The second illustration is taken from one of my own books, 'The Pulse of Asia.'

"Among primitive men the nature of the province which a tribe happens to inhabit determines its mode of life, industries, and habits; and these in turn give rise to various moral and mental traits, both good and bad. Thus definite characteristics are acquired, and are passed on by inheritance or training to future generations" (p. 15).

"The plateaus and deserts of Central Asia entail upon the Khirghiz the nomadic life, and this accentuates certain characteristics, such as hardihood, hospitality, laziness, morality, and family affection. The oases

of the basin floors, on the other hand, cause the Chantos to practise intensive agriculture; and the sheltered easy life, thus made possible, seems to induce weakness of will, cowardice, immorality, and the weakening of those ties between parents and children which lead to careful training of the growing generation. Religion and other causes play an important part, but still there remains much of the character of the Chantos and Khirghiz which owes its origin more or less directly to physical conditions. This is probably true of all races. Not that a single individual's character in a civilized community is directly influenced to so great an extent by the inorganic world around him. He inherits, or receives through the training of others, most of what he is. Nevertheless, inheritance is merely the summation of past training; the training of the average man is strictly in accordance with the social order in which he is born; and the social order owes much of its character to the sea, the plains, the forest, the mountains, or the factory river, by which the occupation of the majority of the people is determined. Those who belong to the so-called upper classes of society are apt to forget that the *average* man is limited by physiographic conditions much more closely than they; and the limitations become closer the farther back we go toward the savage state. When all this is considered, it becomes almost impossible to assign limits to the influence of physical environment upon character" (p. 361).

Both quotations could be improved in two respects. In the first place they are too sweeping and parts of them are couched in the form of positive statements of facts, whereas they are really theories to which many able scholars take exception. In the second place, even if they are fundamentally true, they give the impression that geographical influences are more direct than is actually the case. Let us examine them in detail, beginning with the quotation from the 'Encyclopædia.' I have chosen this particular illustration partly because it happens recently to have attracted my attention, and partly because, although the author is not a professional geographer, he has written an article of unusual merit, and his point of view is typical of a large school of writers on geography. The quotation here given is so representative of the best geographical thought, that it seems wise to devote to it more space than to the other.

Passing by the first part of the quotation as to Greece, let us take the phrase "They [the Greeks] possessed the love of country, the vigour and courage which are always found in highlanders, together with the spirit of adventure, the versatility and the passion for freedom characteristic of a seafaring people." The clear implication is that they possessed these two sets of qualities because they lived among the mountains and at the same time had ready access to the sea. It is certainly true that the ancient Greeks were in part highlanders, although the most influential portion of the population lived in small plains, such as those of Attica, Argolis, and Lacadæmon. It is also true that they possessed love of country,

vigour and courage in a high degree. Are these two facts necessarily connected ?

The first step in answering this question is by means of mathematics. We must take all the countries of the world, classify their inhabitants according to whether they possess the given qualities in a high or low degree, and then see whether the highlanders as a whole average much better than the lowlanders. It is easy to pick out countries such as Scotland, Norway, Switzerland, and Japan which agree with ancient Greece in supporting the conclusions of the 'Encyclopædia Britannica.' It is equally easy to say that the modern Greeks do not possess the supposed qualities of highlanders to anything like the extent that their ancestors did, and to pick out other highland countries which are much more deficient. For instance, South China, eastern Siberia, Mexico, and Central America are highland countries, but few people would cite their inhabitants as examples of love of country, vigour, and courage. Tibet and much of Persia are highlands, but both are notable for the cowardice, lack of vigour, and lack of real patriotism which characterize their people. We might name other highland countries part of which support our author's assumption while an equal number refute it. Or we might contrast the patriotism, vigour, and courage of the Dutch, most of whom have never seen even a hill, with the lack of patriotism, inertia, and cowardice of the Guatemalans, most of whom never go out of doors without being within sight of mountains.

When we inquire as to "the spirit of adventure, the versatility and the passion for freedom characteristic of a seafaring people" we are again met by contradictions. Possibly the Eskimo, South Sea islanders, and Zanzibaris possess these traits in a somewhat attenuated form, but many persons would pick out these races as examples of almost the opposite characteristics, and yet they are pre-eminently seafarers. On the other hand, when compared with these races, the people of the Caucasus, the south Germans, the Poles, and the Swiss might well be described as possessing a "spirit of adventure, . . . versatility, and the passion for freedom" in spite of having nothing to do with the sea.

Coming now to the next statement, we read that "the great variety of natural products as well as the facility of maritime communication tended to the early growth of commercial enterprise." The opponent of this view will probably admit that facility of maritime communication is certainly an important factor, but he will perhaps claim that Greece does not have a great variety of natural products, and is in fact a decidedly poor country. Moreover, it is an open question whether a great variety of such products is a necessary condition for the development of a commercial people. England began to hold a high place commercially when she was still comparatively poor in natural resources, at least in those that had yet been exploited. Holland, even now, would be a poor country were it not for the extraordinary industry of her people. On the other

hand, New Guinea, Borneo, and the Philippine islands are genuinely rich in natural products, and possess great facility of maritime communication, but these things have not greatly "tended to the early growth of commercial enterprise." "The peculiar beauty of the scenery" in these East Indian regions has been equally ineffective in quickening "the poetic and artistic instincts of the race," although the beauty, judged by most standards, is greater than that of Greece.

It would be easy to point out case after case where the supposed geographical principles illustrated by this account of Greece are flatly contradicted. I by no means intend to imply that there is no truth in them, but merely that they have not been fully elucidated and properly applied, or else that due allowance has not been made for other factors. One trouble, as has already been indicated, is that we have failed to make our science exact, and hence our results partake more or less of the nature of guesses. Small wonder, then, that the historians, with their minds bent on definitely recorded facts, have not felt the necessity of utilizing our conclusions as much as seems to us advisable. They say that human character moulds physical environment more than environment moulds character. A man with British pluck or hard-headed German persistence can get a good living where a lazy, incompetent African would starve. An artist will see beauty in the most barren desert or the most sombre forest, whereas a transcendent combination of islands, mountains, forests, cliffs, blue sky, and billowy sea will have no effect on the man whose soul is dull and sodden. The Greeks, they say, were great because of some innate racial quality which had no ascertainable connection with environment. It was that which gave to their minds a quickness and energy which made them capable of the love of country, vigour, and courage which the highlands perhaps may have fostered; the same quality endued them with the spirit of adventure, the versatility, and the passion for freedom which found full scope because of the peculiar relation of Greece to the sea. Because of their mental energy the Greeks, even though their country was no richer than many others, took advantage of what wealth they had and of their favourable location and great facility of communication, and thus commercial enterprise became highly developed among them. Similarly the alertness of their minds caused the evolution of art, and their environment simply permitted the expression of their natural tendencies. Thus, after all, say the historians, physical environment is of small importance compared with racial character, and character arises from causes which no one as yet really understands. To this the geographers offer no convincing reply. It would be convincing if they could say, "All races who have lived in a beautiful environment have developed artistically," or "All who have lived in highlands have been brave," or "All dwellers in archipelagos off the coasts of continents have become highly commercial." We cannot say these things with any conviction, however, and even in such matters as the relation of a moist, tropical climate to the

inertia of equatorial races we cannot yet frame positive geographical laws. This is partly because we have not made our work sufficiently statistical, and partly because the elements of racial character, or heredity, and of moral and religious ideals introduce so many complications which have not yet been unravelled.

Hitherto geographers have usually taken examples here and there. In the future we must base our results on all the countries in the world. If we are studying commerce, for example, we must divide the world into divisions of approximately equal size, either countries or parts of countries, and proceed to separate these into groups according to some fair and definite standard of trade *per capita*, both internal and external. Next we must examine each group to see what qualities all of its members possess in common. We shall presumably find that those in the first group, that is, those most highly developed commercially, are all or almost all located on the seacoast and in the temperate zone, but that they include both the Latin and Teutonic races, and perhaps the Japanese. Further search may show that the regions of this class almost always, but perhaps not absolutely always, possess coasts with a considerable number of easily accessible harbours which are rarely or never frozen. It may further appear that they either possess a temperate climate of the type where cyclonic storms bring rain at all seasons or else fall in the region where such conditions prevail most of the year, but a moderate degree of subtropical drought prevails in summer. Moreover, we may also find that in certain places recent migration from one of the older commercial nations causes places not possessing the above-mentioned characteristics to fall into the first class. Finally, having completed our examination of the present, we must make a similar test of the past. Before that can be done, however, we must have definite knowledge as to the climatic and other geographical conditions at the specific time when any ancient country rose to the first class. When our survey has thus been extended as far and as definitely as possible both in time and space, we shall at last, perhaps, be able to formulate a genuine law as to the geographic conditions under which commercial development takes place.

We shall probably find that for high commercial development the following elements are essential. First, a moderate degree of accessibility to other countries; second, an interior which is fairly productive; and third, a climate characterized by a strong differentiation of the seasons, and by a somewhat low temperature during at least part of the year. With these physical qualities we shall also probably find that a certain definite type of energetic racial character is always requisite, and that when this type of character is transported to other geographical environments, commerce, for a time at least, thrives there also. Thus even when this long process of investigation is complete we may still be left in doubt as to whether such a phenomenon as commercial development is primarily due to physical environment, or to racial character, or whether it is due

to both and the two are inextricably connected. When geographers have made exhaustive studies of this particular point and of hundreds like it, their results will be gladly accepted by historians, economists, and other students of human evolution.

Turning now from the necessity of careful mathematical analysis to the importance of indirect rather than direct influences, let us consider the last words of the quotation from the 'Encyclopædia.'

"The effects of physical environment are no less noticeable among the modern Greeks. The rural populations of Attica and Bœotia, though descended from Albanian colonists in the Middle Ages, display the same contrast in character which marked the inhabitants of those regions in ancient times."

Apparently the Albanians who came to Bœotia and to Attica in the Middle Ages were of the same stock, and engaged in essentially the same occupations, chiefly agriculture. Those who settled in Attica were influenced somewhat by the city of Athens, and by its relatively active life, and many authors would ascribe to that the difference between them and their brothers in Bœotia. Doubtless this has had its effect, and it is one of the important indirect influences of geographical environment. Nevertheless, this does not fully explain the matter. The Albanians who came to Bœotia were located in a place where they were more in contact with the world than in their original mountain homes. Therefore, they ought to have responded somewhat to this, although not so much as the Atticans. On the contrary, they seem to have declined in energy and alertness, and to have become dull and stupid. There seems to be no geographical cause which can be directly connected with this result, but is there any which would produce it indirectly? The work of Sir Ronald Ross seems to suggest that such an indirect cause may be found in the comparatively poor drainage of Bœotia and good drainage of Attica. Till recently one of the most prominent physical features of Bœotia has been the Lake of Copais with the marshy lands which surround it. These have long been great breeding-places of the anopheles species of mosquitoes, which carry malaria. Accordingly, Bœotia has been regarded as one of the most malarial places in Greece. Greece, itself, as is well known, is one of the most malarial countries in Europe. According to Ross, at least a third of the Greeks during their childhood suffer from malaria so seriously that they are permanently weakened. Many show enlarged spleens or other evidence of physical deterioration. The investigations of W. L. S. Jones, combined with those of Ross, seem to show that in the days when Greece was in her prime, malaria was much less prevalent than at present, and that the increase of the disease from the fourth to the second century B.C. may have been an important factor in occasioning the decline of Greek character. Even in ancient times, however, Bœotia was apparently afflicted with fevers more severely than were other parts of the country. Attica, on the other hand, both now and in the past, has been

relatively dry with few undrained marsh lands, and with little irrigated land where the water stands long enough to breed mosquitoes. Hence it has never suffered so greatly as Bœotia.

One of the points which Ross and Jones emphasize is that malarial fevers not only weaken the physiological functions, but have a serious influence upon mental activity. No one who has travelled much in malarial countries can question this. The man who suffers from malaria for a month or so at the end of the summer in Asia Minor, for example, as every traveller knows, often becomes weak and inefficient. He is apt to lose his energy and initiative. He may do his work from day to day, but it is done languidly and carelessly. Moreover, the effects do not pass at once, but can be distinctly seen for weeks or months. No disease is more insidious, especially where it is endemic rather than epidemic. Under such circumstances it is pre-eminently a disease of childhood. The great majority of the children suffer from it at an early age and there seem to be few who are genuinely immune. The effects in childhood are apparently far more lasting than in maturity. If the children of a community suffer seriously from malaria, they are likely to grow into men and women who are weakened physically and dulled mentally. Hence it seems not improbable that the much greater prevalence of malaria among the Albanians who settled in Bœotia than among those in Attica may account for the present difference in character, and the same cause may account for the difference between the ancient Bœotians and Atticans of Hellenic stock.

Fortunately the means of testing this theory are at hand. The Lake of Copais has been drained by a French company. The swamps are disappearing, and if due preventive measures are taken in the irrigated lands of the old lake-bottom, mosquitoes will soon become no more abundant in Bœotia than in Attica. If malaria is really the cause of the Bœotian dulness, the people there ought to improve within a few generations. How long such a process should take is of course uncertain, since we cannot tell how far the disease has weeded out or driven away some of the best elements and has permanently weakened the physical stamina of those who remain. At any rate, it is evident that we have here an example of a possible type of indirect geographical effects, which may be of high importance.

This does not end the matter. In an article on "The Burial of Olympia," in the *Geographical Journal*, vol. 36 (1910), pp. 657–686, I have shown that changes of climate, which seem to have taken place in Greece, may have done much to increase the amount of malaria at certain times, and to decrease it at others. Apparently from about 400 to 200 B.C., as indicated by the trees of California on the one hand, and by various lines of evidence in Asia on the other, Greece became increasingly arid, but by a curious apparent contradiction there was a distinct increase in the amount of stagnant water in the Greek valleys and basins. This would tend to

breed mosquitoes, and might do much to increase disease. It is well known that at this time the character of the Greeks declined greatly, and this indirect geographical influence may have been a factor. At the same time, if we are right as to the occurrence of climatic changes, the productivity of the country must have fallen off greatly; many farming communities must have been reduced to poverty, not all at once but little by little; the standards of comfort must have been lowered; the amount of products available for commerce must have declined; the tendency to emigrate to the towns or to other countries must have been stimulated; and in all these ways a distinct change in the character of the people must have been encouraged. How great these indirect influences may have been we cannot yet say, but they are certainly worthy of profound study.

Let us now turn to the second of the two quotations which serve as our text. The point of view is similar to that of the quotation on Greece except that there is more recognition of the fact that physical environment does not act directly in producing its supposed results upon human character, but indirectly through various steps. Nevertheless, the quotation conveys a wrong impression, as is evident from the words italicized in the following sentences:—

"The nature of the province which a tribe happens to inhabit *determines* its mode of life, industries, and habits; and these in turn *give rise* to various moral and mental traits, both good and bad. Thus definite characteristics are acquired, and are passed on *by inheritance*, or training to future generations." These words, as well as others in the quotation, suggest that physical environment acts with a far greater directness than is probably the case. They seem to ascribe to it a motive power which it does not actually possess. Nevertheless, in the volume from which this quotation is taken, and much more in later writings I have tried to show that geographical surroundings are not in themselves a source of energy or movement, as it were; that is, that they are not the source from which human development arises, but are merely forces which serve to guide movements already initiated, or to mould plastic materials whose substance has been created by some other power. These metaphors, however, express only a part of the truth. They do not touch upon the fact that in geography, just as in biology, the main function of environment is the *selection* of certain characteristics for preservation or extinction. Every geographer probably recognizes the truth of this statement, but it rarely finds definite expression.

In the organic phases of the science of geography our task is not to determine how variations in the animate creation arise, but to determine how, when variations have once arisen, they are selected for preservation in one region but not in another. In other words, our object is to discover how the selective action of geographical environment controls the *distribution* of animate nature. This includes not only the distribution of biological

species and races, and of physical qualities, but also the much more interesting distribution of human habits, institutions, and mental and moral characteristics. In studying this matter we need to follow the biologists in distinguishing carefully between heritable characteristics which are inevitably passed on from generation to generation and acquired characteristics which are passed on only by force of example or training. Among plants and animals changes of physical environment are certainly competent to cause distinct morphologic or somatoplasmic changes, as may be seen when a plant that is kept well watered and warm runs rankly to leaves, when an animal that is kept cold and half starved becomes stunted, or when a white man who has lived long within the tropics becomes sun-browned and unduly sensitive to slight changes of temperature. It is an open question, however, whether such acquired characteristics have any effect upon offspring. Similar physical conditions may cause the offspring to possess characteristics similar to those of their parents, but these characteristics are not innate. Nevertheless, so far as the development of character among the denizens of a certain area is concerned, they are as important as if they were inheritable. To a still greater extent the effects of exercise or training seem to be limited to a single generation, and are not passed on to offspring. Nevertheless they have a pronounced effect upon the succeeding generation. This appears in two ways. In the first place, parents who either over-exert themselves or are unduly sluggish and inefficient are not likely to have such strong descendants as those who live more rationally. In the second place, if the parents have acquired a given method of action, that same method is likely to be passed on to their descendants through the force of parental training or example. Hence in all these ways any change which physical environment produces upon a given generation is quite sure to be reflected in the next generation.

Another type of variation is more important than those just mentioned. It is a well-known fact that no two individuals of the same species are exactly alike. Variations between parents and offspring are bound to occur, and no two brothers or sisters are ever precisely similar. Variations of this sort appear to be the fundamental cause of the evolution of new species and races among animals, and of the human evolution which manifests itself in the development and decay of civilization. Among men we may rightly say that mental variations are far more important than physical. Such variations cause the quality of inventiveness, that is, the capacity to think of new ideas; and all human progress comes from the putting into effect of some new idea, whether it be merely the adornment of a blue dress with red thread or the piercing of a mountain by a tunnel. The importance of geographical environment as a factor in human progress depends upon its power to foster or hinder the fruition of ideas. The idea of ornamenting a blue cloth with red will fall to the ground and perish if there is no red dye available; and so will the idea of a tunnel if the materials for iron tools and explosives cannot be procured.

All this, I am well aware, is perfectly familiar, but it needs greater emphasis and more conscious recognition than it has yet received. Take the case of the Khirghiz mentioned in our second quotation. Some of these people live in a habitat consisting of two widely separated parts—first, desert plains where little can be raised except grass; and second, high plateaus whose main product is also grass of very fine quality, which unfortunately is available for only a few months in summer. The plains are so dry and the plateau so cold that it is impossible to get a living by agriculture. Domestic animals are almost the only source of livelihood, and even these cannot be supported in any large numbers unless they are frequently moved from place to place. Under such circumstances human invention—unconsciously of course in early stages—went to work. The men who thought of matters pertaining to agriculture, mining, fishing, commerce or manufacturing as means of livelihood found that the strict limitations of physical environment rendered their ideas useless. Among the many possible inventions only those pertaining to the nomadic form of life proved feasible. Thus, nature has, as it were, selected nomadic pastoralism and forced the inhabitants to follow it. That selection further acted to select certain mental and moral qualities. Keenness in making bargains does not aid in getting a living where people live in very small groups and almost nothing is bought or sold. Therefore, although the capacity for trade may exist, it is neither helpful nor harmful, and remains dormant. On the other hand, the man who loses his way easily is at a terrible disadvantage. Wandering, as he must, among pathless mountains and valleys he is likely to meet with accidents. His animals are not likely to be well cared for; and in the long run he and his children suffer, so that finally they become poverty stricken; they are looked down upon; they are less strong than their neighbours; and ultimately they are weeded out. On the other hand, the man who is able to find the way on the darkest night and who dares go out in the face of storm or wild beasts to protect his flocks or find those who have strayed is the one who succeeds. He may have no commercial ability whatever, no power of governing, but nevertheless he is successful. Not merely are the chances great that his family will be well nourished and will go on increasing in future generations, but he is the man who is looked up to; the mothers point him out to their sons as an example, and thus those qualities which are selected by the natural environment become the ideal qualities of the race and all training is directed toward their development.

It would be easy to go on and point out how this same process of selection goes on in a hundred ways. What I wish to do here, however, is to show that this process is not completed once for all, as many people would have us believe; it is a continuous process which is going on in every part of the world at the present time, and which always must go on. Of course it depends to a great extent upon social rather than physical environment, but the influence of physical environment can never be obliterated. It is

one of the fundamental selective forces which has acted in the building up of social environment, and any change in it is bound to bring other changes. For instance, take the invention of the steam engine. It is often said that this emancipated mankind from the control of mere distance. In a sense this is true, but it would be much more true to say that this invention merely changed man's *relation* to distance. Hitherto he had been told by nature, as it were, that he could not do certain things, simply because two places were too far apart. For example, Central America has always possessed a climate and soil admirably adapted to the cultivation of bananas. Since the days of the Spaniards thousands of Europeans who have been there have probably wished that they could take some bananas home to their friends, but it has been out of the question, simply because a sailing vessel requires so much time to make the voyage to Europe that the bananas would all spoil before getting there. Even after the invention of the steam engine the voyage was still so long that it was impossible to carry fruit across the ocean until the process of cold storage was invented. After the invention of the steam engine and of cold storage, the idea of transporting bananas, which had hitherto been impossible, became perfectly feasible. The features of nature which foster the growth of bananas were acting just as they had acted before, but now the introduction of another human element into the equation gave a positive instead of a negative result. Hence to-day we have lines of steamers running regularly from Central American ports not only to those of England, but to continental Europe and America.

Moreover, in Central America and neighbouring regions the existence of thousands upon thousands of acres of banana plantations is having a distinct effect upon the inhabitants. Hundreds of white men are going to the country and are compelling the natives to work with a degree of system and orderliness quite beyond their former conceptions. They are showing the natives that the tropical diseases, hitherto looked upon as a matter of course, are not a necessary part of existence, and it is likely that in time these will be eliminated. Meanwhile those who have the sense to protect their families by the white man's methods will have a lower death-rate than the others, and will show a greater rate of increase. In this way and many others we may fairly say that the change in methods of communication is having a decided influence upon the character of the natives of Central America. All the physical conditions are exactly as they were before, but because of a change in the one factor of distance or time of transit, those same physical conditions not only produce bananas for the native, but cause Europeans and Americans to say, "We also want bananas."

In a similar way, if physical environment changes it brings with it an equally great chain of consequences. For example, suppose that the number of icebergs, fogs, and storms in the north Atlantic ocean should increase to such an extent that ships from England would be obliged to

go far to the south in order to reach New York. Almost certainly the trade between England and the United States would fall off. English ships would tend to go to European, African, and Asiatic ports rather than make unduly long, stormy, and dangerous trips to America. American ships, on the other hand, being forced to go to a southern latitude in mid-ocean, would tend far more strongly than now to go to Mediterranean ports. Suppose this state of affairs became so bad that no steamers sailed from England Would not the commercial spirit of the country greatly decline? Take a place like Liverpool. To-day the spirit of commerce dominates the city; the ideals and education of the place are thoroughly saturated with it. If, however, there were no commerce, all this would vanish. Liverpool would become a place of no importance. Its ideals would become those of a provincial fishing town. It would have no such institution as the Liverpool School of Tropical Medicine, with Sir Ronald Ross at its head. If any man under those circumstances had the idea of founding such a school he would be so ridiculed that that particular type of inventiveness would be stifled. In a hundred other ways the character of the civic life would change. This is an extreme example, but not too extreme. Conditions such as we have postulated probably prevailed in the Atlantic ocean not many thousands of years ago during the later stages of the glacial period. We may fairly surmise that if the world had reached the present stage of development ten thousand years ago, Liverpool, and England as a whole, would have played no more part than Iceland now plays, and the character of their people, even though composed of the same ethnic elements as at present, would have been like that of the Icelanders.

The lesson of the preceding pages is clear. Geography, the oldest of the sciences, has for many years been content to use widely different methods in two of its main phases. In all that pertains to map-making and the like it has been thoroughly practical and highly mathematical. In the phase which deals with human character and history it has been largely theoretical. The science has now reached the point where exact methods must be applied to the second phase. We have been groping for the right methods, and in many cases have doubtless made mistakes. We have learned at last, however, that in its relation to man geography is primarily the process of the selection of certain qualities, habits, or institutions for preservation in certain places. As yet, to be sure, we have worked the matter out thoroughly in only a few cases. It is extremely difficult to single out the great steps of human progress and to show how some of them have revolutionized the relation of man to his geographical environment and brought into play a new series of selective factors. It is equally difficult to discover how physical environment itself has changed from century to century, and in its turn has caused selection to assume new forms. Nevertheless, in all these matters progress is being made. With the friendly help and criticism of our sister sciences

we are advancing not only toward the time when geographical environment will be recognized as one of the great fundamental factors in the evolution of human character, but toward the time when we shall be able to show the processes by which it plays its part. When that is accomplished a knowledge of geographical laws will be of primary importance in enabling us to discover how certain evil traits of character may be eradicated and good ones fostered in their stead. Geography will be so interwoven with history that the two will be inseparable.

DR. DE FILIPPI'S ASIATIC EXPEDITION.

Dr. F. De Filippi sends from Skardu, Baltistan, the winter quarters of the expedition, the following account of the scientific work done up to November 5.

The work of the expedition began with comparative observations taken at the Royal Hydrographical Institute at Genoa, which is to be the reference station for all gravimetrical mensurations. On August 22 the party landed at Bombay. Professor Dainelli, Lieut. Antilli, and Marchese Ginori, with the guide, Petigax, went straight up to Kashmir, while Dr. De Filippi paid a visit to Simla to obtain the co-operation of the Technical Departments of the Government of India in various researches, and Commander Alessio, with Professor Abetti, went to Dehra Dun, the seat of the Trigonometrical Survey of India. Here, between August 25 and September 4, they took a complete set of comparative pendulum and magnetic observations, and they made the first experiments of wireless transmission of time signals with Delhi, Simla, and Lahore, using the wireless receiving station of the expedition. By September 8 the whole party was again collected in Srinagar, Kashmir. Here, from the 12th to the 19th, Alessio and Abetti took the pendulum and the magnetic observations. Two days later the caravan journey was begun, and on the 26th the Zoji-La pass of the Himalaya was crossed (11,120 feet). From this point to Skardu the march was interrupted twice for gravimetrical and magnetic work. The first station was made in Dras (10,020 feet), a small village at the foot of the Zoji-La, the second in Tolti (about 8200 feet), a Balti village in the Indus valley. The observers have been able so far to surmount the difficulties of carrying on their work with the most rigorous scientific methods, notwithstanding the peculiar circumstances. So far the sky has been clear enough to allow to take regular astronomical observations, both in connection with the gravimetrical work and with the determination of the geographical co-ordinates of the stations.

Wherever a halt of some days has been made, Marchese Ginori has put

up the meteorological station; besides which, no opportunity has been missed to take comparative readings of the instruments. These may lead to interesting conclusions on the limits of accuracy of the various instruments, especially in regard to the determination of altitude.

These halts and the easy marches have afforded to the geologist, Professor Dainelli, the opportunity to make frequent excursions in Kashmir and in the Dras and Indus valleys, and to collect data which have led him to new and interesting views about the constitution and the geological history of this district. Abundant lithological material has also been collected. Lieut. Antilli, besides collaborating with Professor Dainelli in collecting photographic documentary evidence for geology, has lent to the topographers the valuable help of photography, and has busied himself with the general illustration of the country traversed.

The expedition reached Skardu on October 25, and established itself in two little bungalows, while the small dens of the neighbouring serai were turned into laboratories and store-rooms. Skardu, the capital of Baltistan, is 7700 feet above sea-level, and lies in a vast sandy plain, a widening of the otherwise narrow and precipitous Indus valley, where the Shigar and the Indus rivers meet.

A very interesting experiment was at once made. Having mounted the receiving wireless station, Alessio and Abetti were able, in the evenings of the 29th and the 30th, to receive very distinctly, and to register the wireless time signals transmitted by Lahore according to a prearranged plan. The possibility is thus established of adopting this method in the field, even among such natural obstacles as high ranges of mountains. The preliminary experiment will be followed by a series of transmissions of time-signals sent by the Lahore station and received simultaneously by the Dehra Dun station and by a station of the expedition. As long as the latter will be in the Indus valley, which is included in the triangulation of India, these wireless communications will permit determinations of differences of longitude sufficiently correct to calculate, when taken together with the determinations of latitude, the deviation of the plumb-line. Further on, these communications will be most useful to check the chronometers and determine the longitude of places in the unknown district which the expedition intends to explore next summer.

Marchese Ginori has begun to send off pilot balloons, followed in their course with the theodolite, simultaneously with identical observations done in various Indian observatories, according to a prearranged plan for the study of air-currents in the high atmosphere.

Finally, in the first days of November, an excursion was made up the valley leading to the Burji La and the Deosai plateau, and a place selected in it over 14,000 feet altitude, to which is now being conveyed the camp and the scientific equipment. It is hoped that, notwithstanding the advanced season, it will be possible to make here a station for pendulum and magnetic observations, for researches on the total solar radiation with

various pyrheliometers, for pilot balloon experiments, and for telephotographic work.

After the completion of this work, the members of the expedition will return to Skardu, which will in its turn become a station for gravimetrical and magnetic observations, followed by the determination of latitude and longitude (by the wireless method), for various topographical work and for researches in meteorology and aerology. Meanwhile, Dainelli will continue the geological excursions until prevented continuing his work by the winter snows.

The scientific equipment has suffered no damage in the long journey, and is in perfect order. All the members of the expedition have always enjoyed very good health.

Ever since its arrival in India the expedition has met with the greatest favour and the most cordial support in every quarter, from His Excellency the Viceroy and the various departments of the Government of India, down to the lambardar and the population of every Balti village which has lain on its way.

NOTTINGHAMSHIRE IN THE NINETEENTH CENTURY.

The Geographical Factors in the Growth of the Population.

By B. C. WALLIS.

Nottinghamshire is neither an agricultural county like Cambridgeshire nor so definitely an industrial county as Lancashire. The county lies tucked up against the south-eastern corner of the Southern Pennines and mainly north of the Trent, which is frequently considered as the southern boundary of the eastern portion of manufacturing England.

The survey of Nottinghamshire which is made in the following pages is intended to emphasize the geographical circumstances which have been mainly instrumental in causing the distribution of the population of the county as it exists at present. Such a survey must be to some degree numerical, if it aims at precision of statement; and the statistical matter upon which the conclusions are based is introduced solely from a geographical point of view. The complete investigation provides an example of an aspect of historical geography which has received but scant consideration in the past.

A preliminary conception of the development of the population within the county may be attempted in comparison with the changes which have taken place in an area which includes the neighbouring counties. This district is shown in the maps, Figs. 2–4, which indicate the distribution of the population in the groups of parishes which form the enumeration districts of the census officials. Nottingham county is composed of eight such districts: East Retford, Worksop, Mansfield, Basford, Nottingham, Southwell, Newark and Bingham (Fig. 1).

For the purposes of this investigation the density of the population has been obtained by dividing the total population of each portion of the country by its total area; it seemed wiser to disregard the distinction

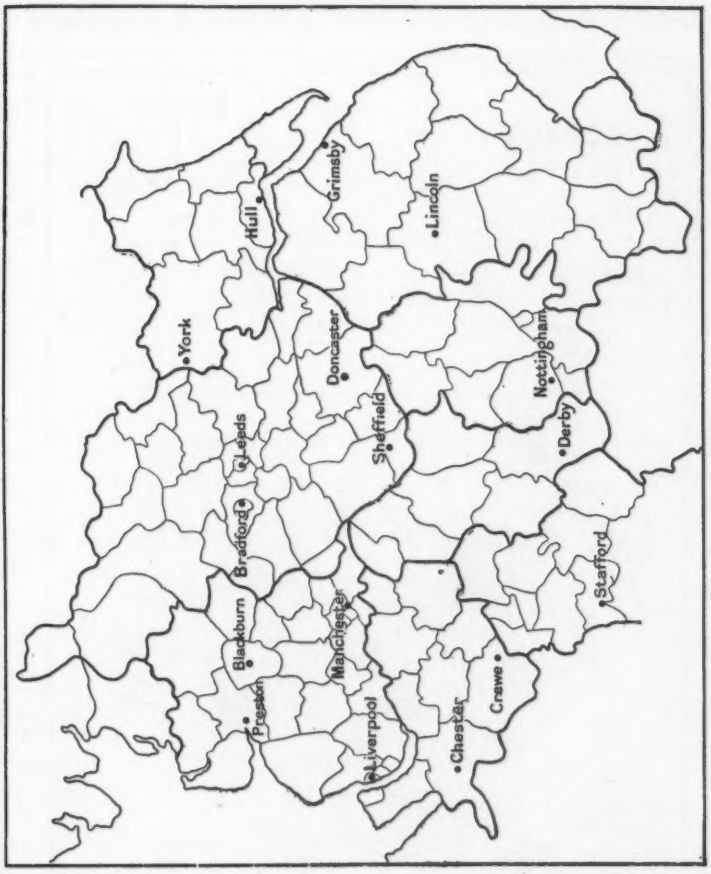


FIG. 1.—THE SOUTHERN PENNINES: CENSUS DISTRICTS AND TOWNS.

between rural and urban districts, the more especially as the latter have overflowed into and affected parishes which were entirely rural at the commencement of the Nineteenth Century.

Population Changes on the Slopes of the Southern Pennines.

In 1801, in that part of Middle England which lies to the east of a line from York through Nottingham the only district with a density of

population higher than 128 per square mile was that which surrounded Hull. The population of East Retford and Worksop in the north of Nottinghamshire, of Newark, Bingham, and Southwell in the east of the county, was less dense than 128 per square mile.

In striking contrast with this region was the much denser population

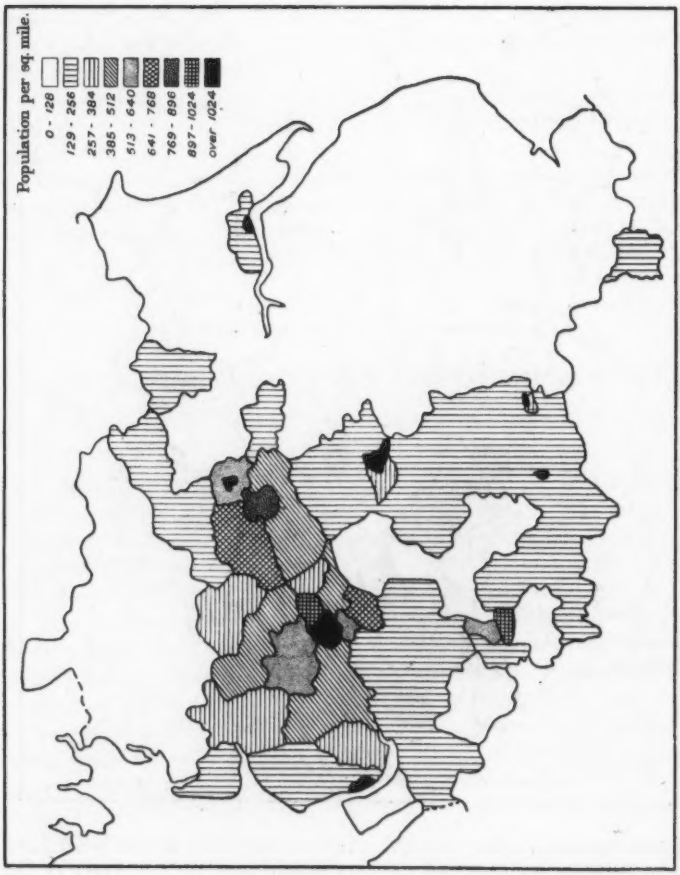


FIG. 2.—THE SOUTHERN PENNINES: DENSITY OF THE POPULATION IN 1801.

of Lancashire and the West Riding, where some districts contained as many people as 1024 per square mile, especially in the neighbourhood of Manchester–Salford, Liverpool, Leeds, and Sheffield.

Cheshire, North Staffordshire, and Derbyshire contained some districts with less than 128, and other districts with between 129 and 256 people

to the square mile; as well as denser groupings of the people round the towns Derby, Stockport, and Stoke-on-Trent.

The three western districts of Nottingham are, like the latter areas, intermediate in population between the very lightly and the very densely peopled areas. Mansfield and Basford had between 129 and 256 people

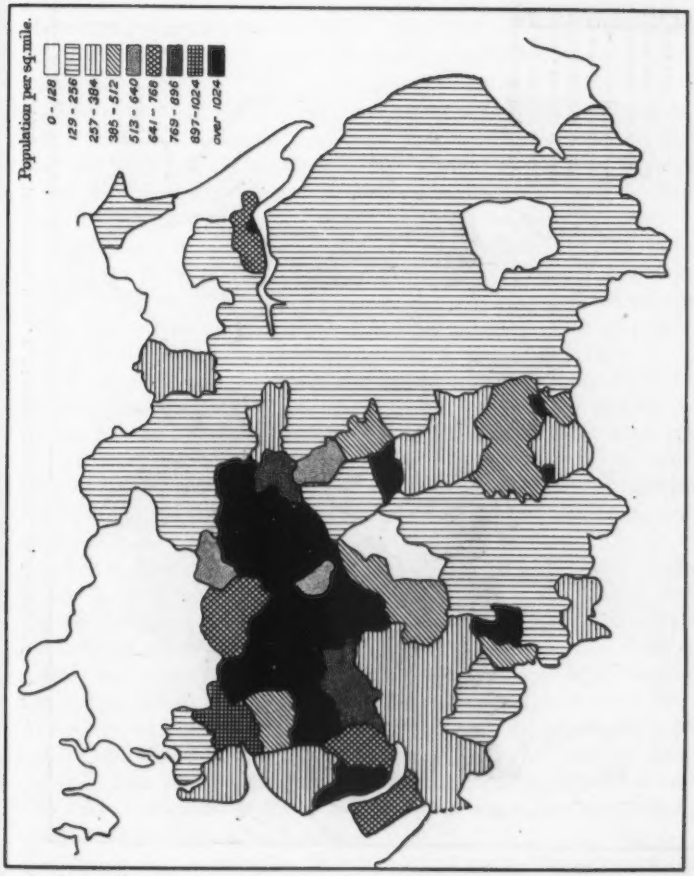


FIG. 3.—THE SOUTHERN PENNINES; DENSITY OF THE POPULATION IN 1851.

to the square mile, while the district of Nottingham had about 2500 to the same area.

At the opening of the century, Nottingham differed from the counties of Lancashire and the West Riding, and resembled Cheshire and Derbyshire in the distribution of the population.

In 1851, few districts had less than 128 people to the square mile, and

most of the districts had increased their population by at least 50 per cent. The average increase throughout England from 1801 to 1851 was 100 per cent.

Roughly, the area west of the line connecting Leeds and Sheffield had

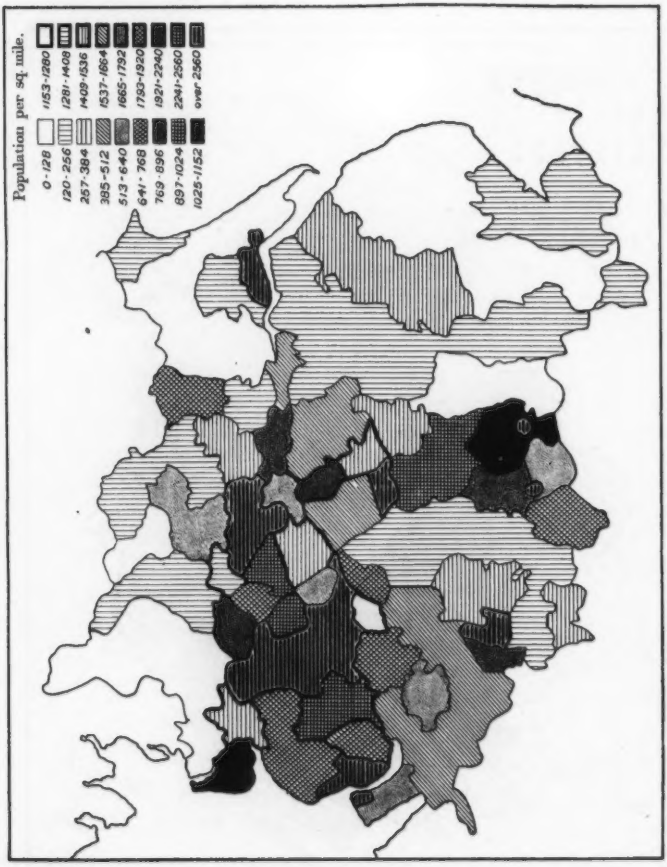


FIG. 4.—THE SOUTHERN PENNINES: DENSITY OF THE POPULATION IN 1901.

increased in density to more than 640 persons per square mile, and the districts where the density exceeded 1024 per square mile had become more numerous. The big towns had extended their population boundaries greatly.

Nottinghamshire still resembled Cheshire and Derby, as the density of the population in the northern and eastern districts lay between 129 and 256, and that of Mansfield and Basford had grown to something

between 257 and 512 per square mile. The town district of Nottingham contained about 10,000 persons per square mile, and had increased its density of population fourfold.

The changes which occurred during the second half of the century differed from those of the earlier period. In the eastern district noted in connection with 1801, very little growth had occurred in some portions and in others the distribution of the population had even declined from above 128 per square mile in 1851 to below 128 per square mile in 1901. The districts which included Grimsby and Lincoln had, however, progressed to a small degree.

The western district had seen continuous rapid growth, so that by the end of the century almost the whole of Lancashire between the Ribble and the Mersey, and the corresponding portions of the West Riding had a density of population exceeding 1024 per square mile, and in the districts near the big towns the density of the people was twice this number.

In Nottinghamshire, population in Bingham and Southwell declined, while that of East Retford and Newark remained fairly steady. The three districts of the south-west had made rapid progress in population in sympathy with an extension of the Sheffield region of dense population which had extended southwards towards Chesterfield and Ilkeston.

Viewing the progress made during the century, it may be held that Nottinghamshire consists of two districts, the eastern portion which resembles the neighbouring county of Lincoln and the western portion which resembles the adjacent portion of Derbyshire. In the southern half of this western region the progress of the population had been similar to that which characterizes the industrial region of Lancashire and the West Riding.

For each of the census years maps have been constructed similar to those in Figs. 2–4. These eleven maps show that the changes detailed in the above paragraphs have been continuous, and this continuous change is summarized in Fig. 5. In these eleven maps the density of the population was shown by steps of 128 per square mile, so that the manuscript map, from which Fig. 4 has been made, contained details for no less than 18 groups of districts. So great detail is difficult to indicate on a printed map, and, consequently, the map Fig. 5 has been made to show in a simpler form the development of the population during the whole century. The districts are divided into five groups in accordance with the rate at which the population has increased.

Group A contains those areas where the population increased steadily throughout the century, and in 1901 was five times as great as in 1801. This group includes most of South Lancashire, the area surrounding Leeds and Bradford, an area north and south of Sheffield, and others near Hull, Grimsby, Stoke-on-Trent, Derby, and Nottingham.

Group B includes the districts in which the population was quadrupled. This group is made up of an area westwards from Goole, detached districts

in Lancashire, the districts round Lincoln and York as well as Mansfield and Basford districts in Nottinghamshire.

Group C comprises the areas in which the population was trebled. It includes most of Cheshire, parts of Derbyshire and Worksop district within the county of Nottingham.

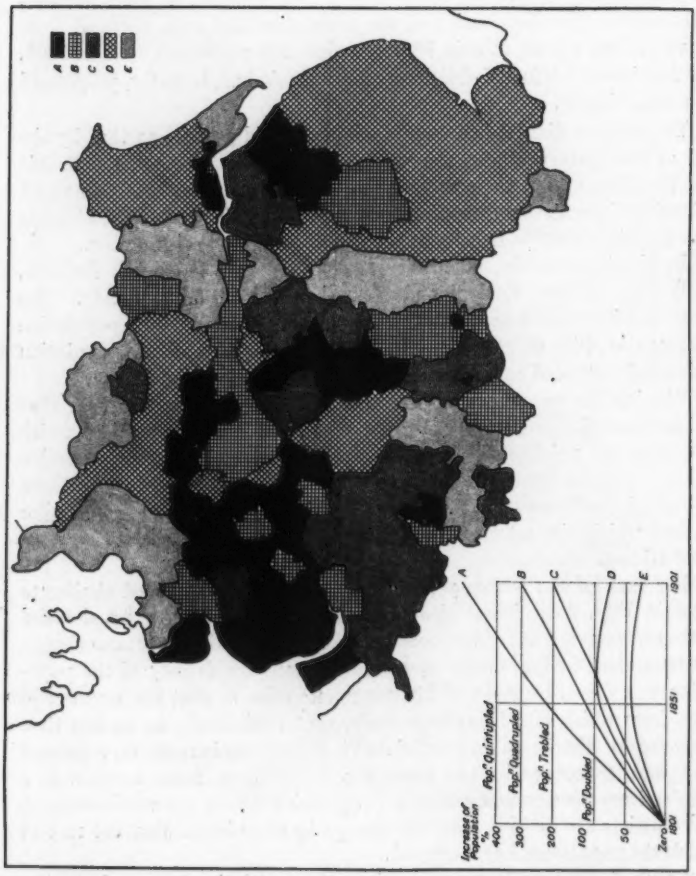


FIG. 5.—THE SOUTHERN PENNINES: CHANGES IN THE POPULATION DURING THE NINETEENTH CENTURY.

Groups D and *E* are made up of areas in which the population increased during the first fifty years and remained steady or declined during the period 1851–1901. Group D includes most of Lincolnshire and detached districts elsewhere, including Newark in Nottinghamshire; and group E consists chiefly of districts which lie near the Trent, such as East Retford, Southwell and Bingham.

The average rate of progress of the population in each of these groups is shown graphically in Fig. 5, where the slope of the curves indicates the rate of the progress, the steeper the slope upwards indicating more rapid change in the population.

Summary.—The district immediately surrounding Nottingham has progressed in population at the same rate as the more extensive manufacturing regions of Middle England. Mansfield and Basford in the south-west, as well as Worksop further north, increased at the same rate as the secondary industrial districts which lie between the chief manufacturing centres.

The eastern portion of the county, containing the Trent valley, stagnated in population in similar fashion to the hilly regions in the centre of Lancashire and in the north of the West Riding, where the farming population on the poorer farm lands declined in numbers.

Newark resembles Lincolnshire and exemplifies the steadiness of the population, since 1851, which characterizes the better farm lands.

On this large scale, therefore, Nottingham is typical of the whole of the Southern Pennine region; the manufacturing districts have increased their population by two, three, or four hundred per cent.; the agricultural districts have doubled their populations where the best conditions prevail, and in all cases have contained a steady population since 1851.

Population Changes in Nottinghamshire Parishes.

The next step concerns the parishes of Nottinghamshire: do the changes which they have experienced reflect the changes which have occurred in the larger areas?

The distribution of the population in 1801, 1851, and 1901 has been worked out and is shown in the maps Figs. 6–8; the rates of change are indicated in Fig. 9. The methods used have been already explained in connection with the preceding maps.

In 1801, only three parishes, Nottingham, Newark, and Retford, had a denser population than 512 per square mile. Most of the other 260 parishes had a population less dense than 128 per square mile, and a line from Nottingham to Mansfield separated a densely-peopled district on the west from a less densely-peopled area on the east.

During the first half of the century progress in number of inhabitants was unevenly distributed. Many parishes had not attained a density of 128 per square mile by 1851. The area which was most densely peopled in that year lay north of the Trent from the Erewash eastwards to a line from Retford to East Bridgford.

By the end of the century the densely-peopled area had grown larger still, and by 1901 included a district about 10 miles wide stretching along the western boundary of the county from the Trent to the large parish of Worksop. While the people had been flocking to this area, they had

been leaving the other parishes, for there were more parishes with less than 128 people per square mile in 1901 than in 1851.

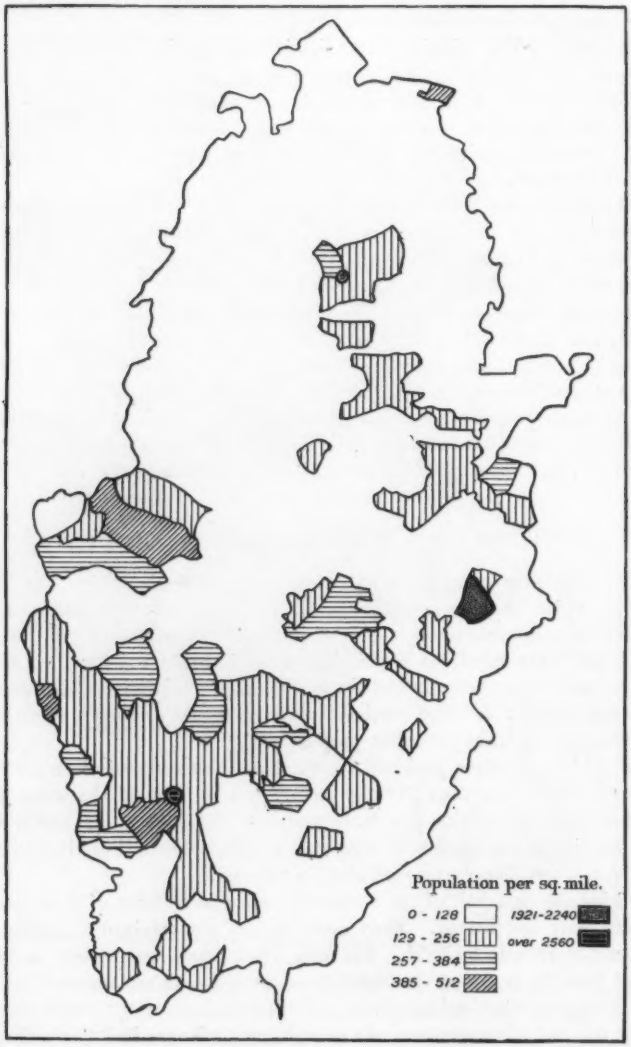


FIG. 6.—NOTTINGHAMSHIRE: DENSITY OF THE POPULATION IN 1801.

In comparison with the district maps the parish maps indicate quite clearly that the growth of the population of a whole district may be due

almost entirely to the growth of the population in a single parish: *e.g.* the only large town, Newark, in the Newark district progressed sufficiently

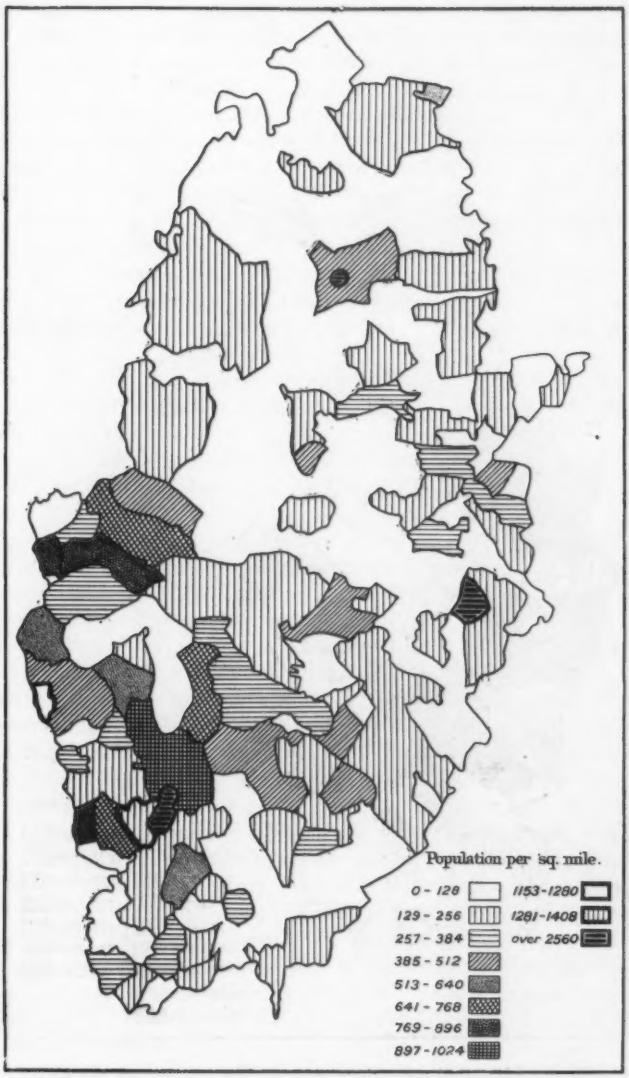


FIG. 7.—NOTTINGHAMSHIRE: DENSITY OF THE POPULATION IN 1851.

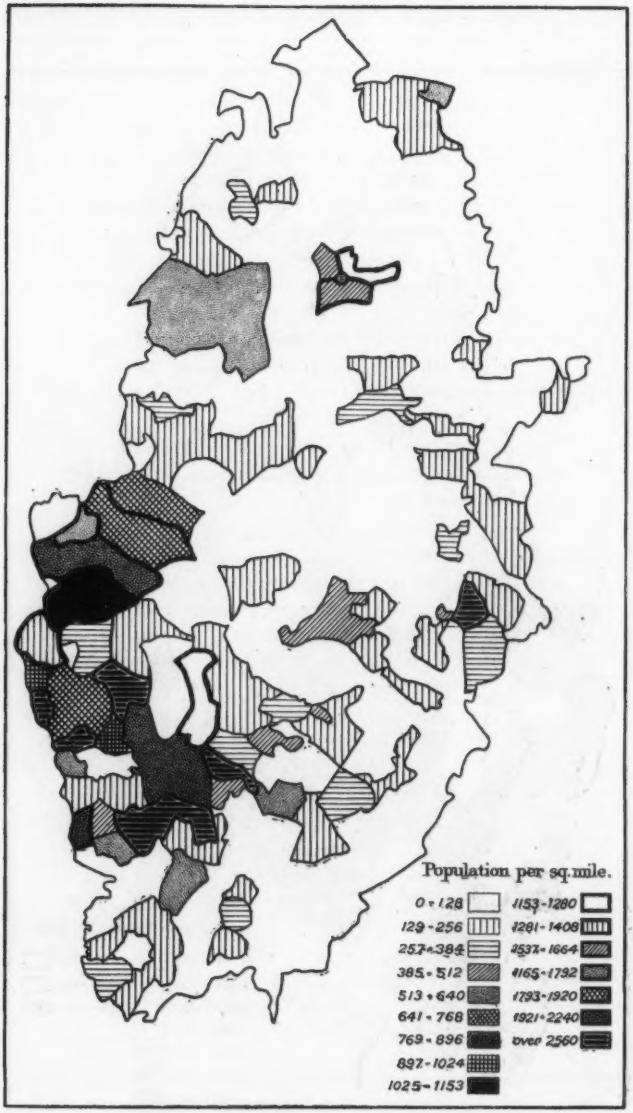


FIG. 8.—NOTTINGHAMSHIRE: DENSITY OF THE POPULATION IN 1901.

to counterbalance decline in other parishes, and Retford's growth masks almost completely the decline in other parishes in the district of East Retford.

The curves which show the rate of change of the population were plotted for each parish, and it became evident that they could not be grouped within the five groups which sufficed in the case of the districts: it has been found necessary to add five additional groups. It will be well to consider the five original groups first (Fig. 9).

Group A.—From Nottingham to the north-west and along the western boundary almost to Mansfield the population increased during the century in similar fashion to the progress in the districts of South Lancashire. Only at Retford and in the north near Sheffield were there other parishes which developed similarly.

Group B.—Two areas show progress similar to that of districts in group B, where the population was quadrupled. These areas extend from Retford westwards to the boundary, and from Nottingham south of the Trent.

Group C.—The largest area within which the population was trebled lies between the parishes in group A and those in group B, *i.e.* between Mansfield and Worksop.

Group D.—Parishes with an almost stationary population since 1851, and with twice as many people in 1851 as in 1801, lie east of the parishes in group C, and in detached patches in the valley of the Trent.

Group E.—There are three groups of parishes in which the changes fell within the limits of group E: they are (i.) in the south-east of the county; (ii.) across the Trent about halfway between Newark and Retford; and (iii.) in the extreme north.

In addition to the parishes of progress—those in groups A, B, and C—there were three other groups of progressive parishes which have been designated by the letters M, N, and P. Those in group M correspond with those in group A in the final result, but not in the way in which this final result has been attained; in group A development was continuous, in group M there was but little increase until after 1851, a more rapid increase between 1851 and 1871, and a very rapid increase from 1871 until 1901. For example, the population of Mansfield parish, in group M, was five times as great in 1901 as in 1801, but the greatest progress occurred during the last few years of the century. Parishes in group N achieved the same result as parishes in group B, and parishes in group P had a trebled population in 1901 like those in group C; but in each case the result was attained mainly during the second half of the century. The map, Fig. 9, shows that most of the parishes in groups M, N, and P lie near Mansfield or Nottingham; there are two other progressive districts, one near Retford and one near Newark.

Parishes of decline have been already noted as falling into groups D or E, where the decline was only relative; in addition to these parishes

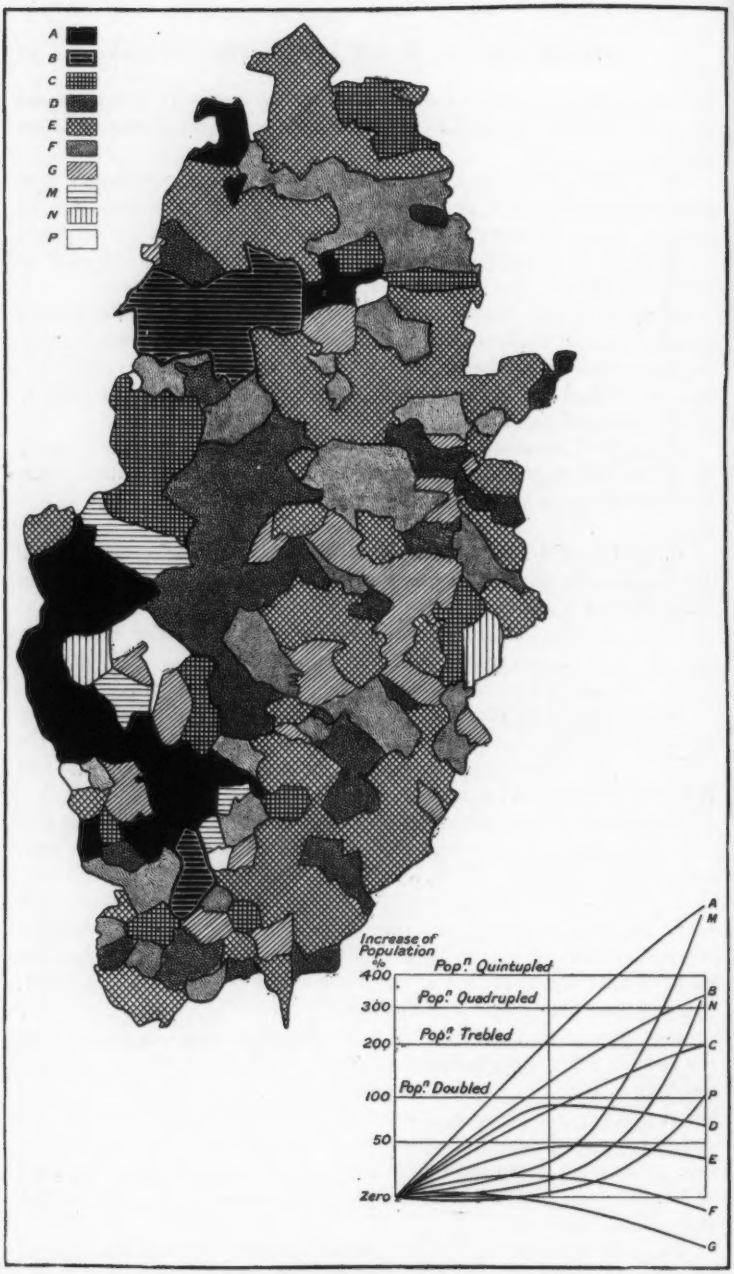


FIG. 9.—NOTTINGHAMSHIRE: CHANGES IN THE POPULATION DURING THE NINETEENTH CENTURY.

there are other parishes of absolute decline, and these are collected into groups F and G. Parishes in group F had increased their population slightly by 1851, but ended the century with about as many inhabitants as there were in 1801. Such parishes are contiguous in four areas: (i.) south of the Trent; (ii.) and (iii.) in two bands across the Trent valley, south and north of Newark, and (iv.) across the county north of Retford.

Group G includes parishes of continuous decline in population. They form an irregular area in the neighbourhood of Southwell. Fig. 9 illustrates these changes and gives rise to the following conclusions.

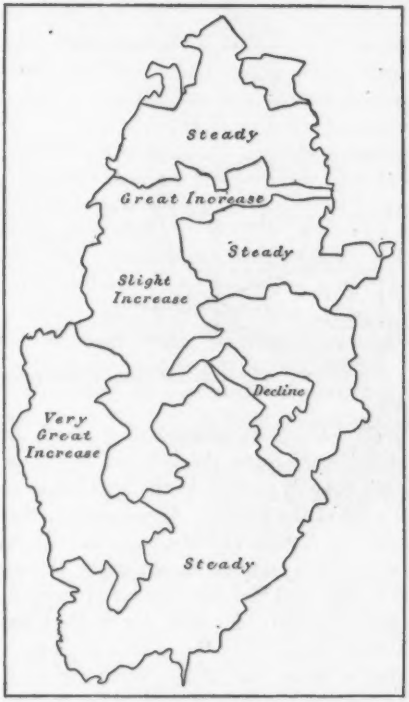


FIG. 10.—NOTTINGHAMSHIRE; SUMMARY OF POPULATION CHANGES DURING THE NINETEENTH CENTURY.

Nottinghamshire contains two distinct portions in reference to changes in the population. There is an area in which the population increased: it lies within a roughly-shaped rectangle of which the boundaries are the Trent on the south, the western boundary of the county, a line down the middle of the county on the east, and a line just north of Retford and Worksop on the north. In all the remainder of the county, with the exception of a few isolated parishes, the number of inhabitants either increased very slightly or declined. Within the rectangular area there occurred a greater increase in the south than in the north.

West of a line from Mansfield to Nottingham, within an area approximately 16 miles long and 8 miles wide, the increase in the population was extremely rapid. Where contiguous parishes suffered similar changes, these parishes usually form a band of country which extends roughly from east to west.

These divisions of the county are summarized in Fig. 10.

The Static Factors in the Environment of the Population.

The environment of the population may be considered both from a static and a dynamic point of view. The chief static factors are climate, relief and geological formation. It will be possible to dismiss the climatic factor in a few words.

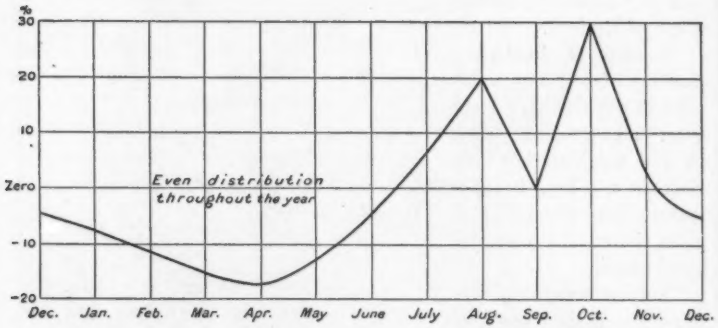


FIG. 11.—DISTRIBUTION OF RAINFALL IN NOTTINGHAMSHIRE.

Climate.—Nottinghamshire is small, the differences in elevation are inconsiderable, and the greatest length of the county is from north to south, roughly parallel to the high ridges of the Southern Pennines which lie west of the county. Consequently, the effects of the Pennine Upland upon the climate of the county are felt with almost precise uniformity. Variations in temperature are slight, the annual rainfall is between 23 and 30 inches, and the distribution of rainfall occurs in belts which stretch roughly north and south, the wettest region being on the west. The monthly variation of the rainfall is shown in Fig. 11, and is not strikingly different from that of the whole region of the Southern Pennines. On the average, the early portion of the year tends to be dry, rainfall increases towards a maximum in August, September is drier, and October is the wettest month of the year.

Relief.—The surface configuration of the county presents but little variation. Robin Hood's hills and a similar hilly area in the north-west are the only portions where the height is greater than 600 feet. From Robin Hood's hills ridges radiate to the south, and south-east. One of these is noteworthy as the water-parting between the Erewash and Leen valleys. Another ridge stretches beyond Kneesal to form the water-parting between the valleys of the Trent and the Idle. This series of ridges forms the elevated portion of the county which lies west of a line from Nottingham to Retford at a level of 200 feet above the sea. The Wolds which border Leicestershire are the only other portion of the county where the land is higher than 200 feet: consequently, more than half the county

lies between 50 and 200 feet, and this lowland comprises the valley of the Trent and the northern third of the county.

The densest and most rapidly increasing population occurs on the upland portions of the county, especially in the neighbourhood of the ridge which lies between the Erewash and the Leen rivers. The lower land as a rule is not at all densely peopled.

On the whole, the population of the county has progressed, migrated, settled, or declined, independently of the relief of the land.

Geological formation.—The structure of the county is intimately related to its relief. The line, 200 feet high approximately, from Nottingham to Retford is represented geologically by a narrow belt of rock, known as the Waterstones, which consist of Keuper red sandstone. In this formation most of the streams which flow into the Trent from the west take their rise.

East of the Waterstones most of the rock is Keuper marl, which occurs on both sides of the alluvium which fills the Trent valley. The Wolds in the south are due to the Lower Lias. West of the Waterstones comes the Bunter, in a broad band of porous sandstone stretching north and south and about six miles in width. This Bunter sandstone is elevated in the south, but in the north is much lower in the valley of the Idle. The western edge of the Bunter touches the Permian (magnesian limestone), which is crossed by the county boundary in the north. From Skegby almost to the Trent, coal-measures outcrop west of the Permian and stretch beyond the county boundary into Derbyshire.

Consequently, the eastern slopes of the Erewash valley form the Nottinghamshire coal-measures; from the water-parting down to the river Leen lies the magnesian limestone; and from the Leen eastwards is Bunter sandstone.

The population is distributed in closer relation with the geology than with the relief. The progressive parishes are either on the coal-measures or upon the southern portion of the Permian. The parishes where the population is steady or has declined are upon the Keuper or the Lias.

Special attention may be drawn to the Bunter for two reasons. First, it is the formation where the parishes are largest; as a rule they are 50 per cent. larger than the average. Secondly, the lowland Bunter in the north has a steady population; the Worksop area, where the Bunter is more elevated, has a progressive population; while the more elevated districts further south, such as the large parish of Rufford, have progressed more rapidly than the parishes on the Bunter lowland.

Geologically, therefore, the exposed coal-measures as well as those which are hidden by the magnesian limestone have given rise to the greatest variations in population. The impervious clay of the Keuper and the Lias occurs where the population has varied least. The Bunter has experienced the most diverse changes, which are indicated by the great progress near Nottingham and Worksop, steadiness in the north, and moderate progress in the middle.

The Reaction to the Static Environment.

The rock structure of the county has determined human progress in relation both to agriculture and to mining.

Mining.—Apart from a small amount of quarrying for gypsum, there is very little extraction of useful minerals except the mining for coal. Throughout the century coal has been mined in Nottinghamshire. When the century opened the collieries were confined to the valley of the Erewash, where the coal-measures outcrop both in Nottinghamshire and Derby. In 1811, there were twenty pits from which coal was obtained, and all of these were on the coal-measures. With the progress of the century the collieries extended eastwards across the water-parting to the Leen valley, and pits were sunk to reach the coal, which lies below the magnesian limestone. This eastward extension of the actual coal workings began about 1861, and continued so greatly that by the end of the century the pits in the Leen valley had become very important sources of Nottinghamshire coal. This gradual progress is indicated by the maps in Fig. 12. On these maps the continuous outline encloses the Nottinghamshire outcrops of the coal-measures and the Permian, and the black dots indicate approximately the positions of the pits actually in operation in the stated years. It may be noted that towards the end of the century pits had been sunk outside this area. At Warsop, east of Worksop, a pit has been sunk through the Bunter, and north of the Trent near Nottingham two pits are worked. Roughly, the pits on the coal-measures themselves fall into four groups: (i.) east of Ilkeston; (ii.) near Eastwood; (iii.) near Pinxton, and (iv.) near Skegby.

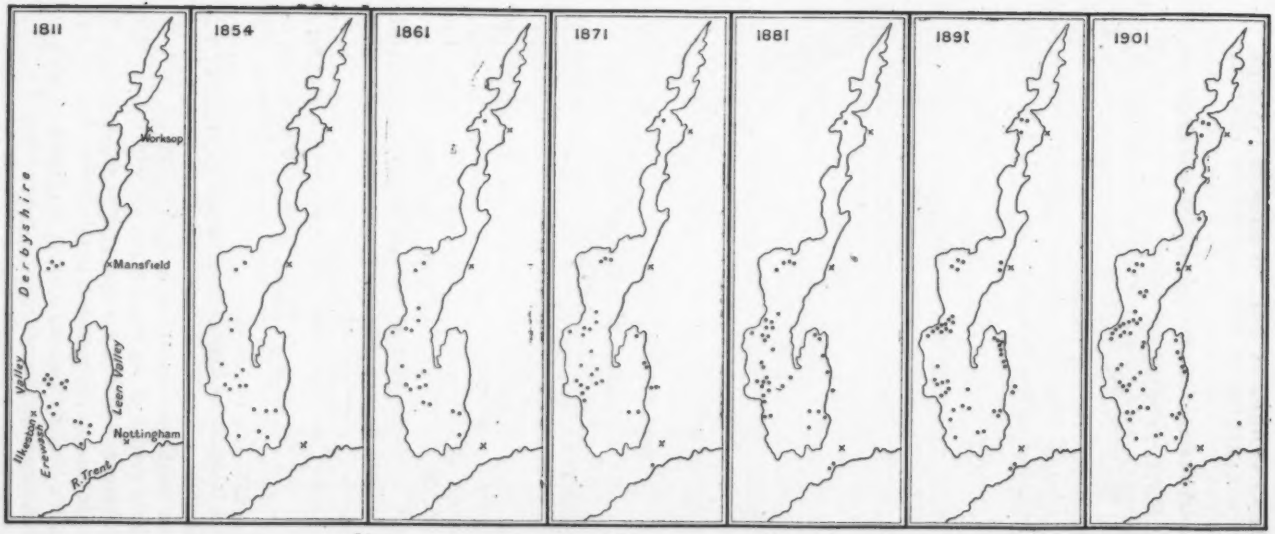
The reaction of the population to the coal-mining industry is indicated in Fig. 13. A few typical parishes have been taken, and the progress of the population is shown by the slope of the respective line in the diagram.

Strelley parish should be examined first: the colliery failed in 1831. The population progressed until that date and then progress ceased, and so great a decline ensued that by 1901 the population was less numerous than in 1801.

Kirkby in Ashfield parish contains coal-mines in the neighbourhood of Pinxton. The population was trebled by 1861, and more than trebled again in the next forty years. The Eastwood district had mines in active work at the beginning of the century, and its population increased to six and a half times during the period. The parish of Hucknall Torkard is typical of the mining industry of the Leen valley. From 1801 to 1861 the population doubled, from 1861 to 1901 the population quintupled.

The large parish of Worksop has an interesting record, and the collieries of Shire Oaks and Steetley Wood are obviously not the sole cause of the changes which have occurred.

The extension of coal mining has coincided both in time and place with the rapid growth in the numbers of the people.



NOTTINGHAMSHIRE COLLIERIES.

The black dots represent Coal Mines.

The enclosed area indicates the area of Coal Measures and Magnesian Limestone.

FIG. 12.

Agriculture.—The static influences of rock structure upon the farming population are rather difficult to determine. An attempt has been made to disentangle from other ideas some general conclusions upon this question, by means of an inquiry into the kinds of crops grown upon the different geological formations. By the courtesy of the Board of Agriculture detailed information has been obtained regarding seven groups of parishes. From this information certain facts have been obtained, and these are

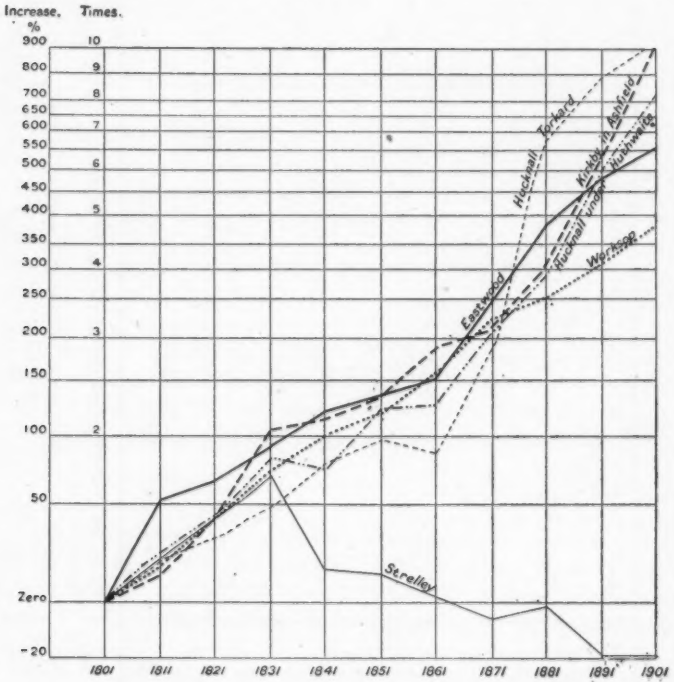


FIG. 13.—POPULATION CHANGES IN MINING PARISHES.

indicated in the tables in the Appendix. Each group of parishes is confined to a single stratum, *e.g.* group X includes only parishes on the lowland Bunter in the neighbourhood of Retford. The returns have reference only to the later portion of the century and are confined to single years, 1870, 1881, 1891, and 1901. For the present purpose, it is requisite to confine attention to the constant factors underlying the variations which are shown by the tabulated values. In regard to these constant factors the following general conclusions have been reached.

The Bunter is largely cultivated, and is the only formation where the

arable exceeds the grass land. Turnips and sheep are most important here, and cattle are least important. The effect of elevation can only be obtained in reference to the Bunter: the upland Bunter contains the most woodland. The upland has also more sheep, more grass, and fewer cattle proportionately than the lowland.

Roughly, about the same proportion of the total area of all the seven groups is given up to cereal growing; but variations occur in the relative proportions of the three crops, wheat, oats and barley. The upland Bunter has more oats and the lowland more wheat.

The Keuper formation yields different results in the north near Retford from those in the south near Nottingham. The south is much more extensively cultivated, and grows more turnips, more barley and less wheat. In both districts about half the cultivated land is given up to grass, and the proportions of sheep and cattle are approximately the same. The Keuper is best for cattle and wheat and worst for oats.

Half the cultivated area of the Permian produces grass, and with the exception of the northern Keuper, this district is the least cultivated.

The Lias agrees with the coal-measures in some important particulars. They cultivate the same fraction of the total area, and the same fraction of the cultivated land yields grass. In the arable lands they are equally good for wheat and equally bad for barley and turnips. They have roughly the same proportion of cattle. They differ in regard to oats and sheep: the Lias has more sheep and less oats.

The most important products are, therefore, grass on the Lias and coal-measures; wheat on the Keuper; oats on the upland Bunter and the coal-measures, turnips on the Bunter; sheep on the Bunter, and cattle on the Keuper.

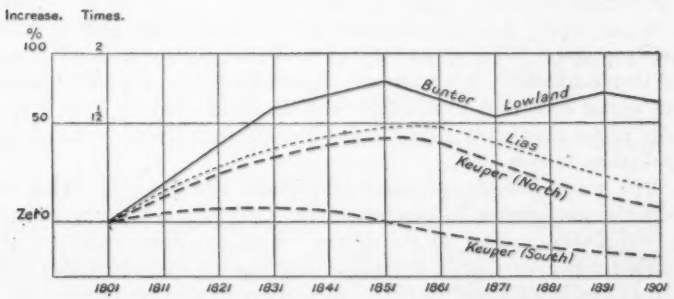


FIG. 14.—POPULATION CHANGES IN FARMING PARISHES.

The fluctuations in the population of some of these regions are shown in Figs. 13 and 14. The influence of agriculture on the populations on the coal-measures and the Permian is obscured by the effects of the coal-mining, but it may be assumed that the effect of agriculture is not nearly

so progressive as that of the coal industry, and therefore it may be assumed that the rates of progress shown in Fig. 13 would be even greater were the farming effect eliminated.

The decline in the purely farming populations is well shown in Fig. 14. All the specimen parishes show a relatively slight increase during the first half-century and a decline since 1851.

The different rock structures in the county have, therefore, caused divergent results in regard to population. They have forced men to farm their lands in different ways, and to this extent have produced some modifications in the population.

Their effects are obscured by the changes due to other elements which may be classed as dynamic, and to these it is now necessary to turn our attention.

The Dynamic Elements.

The dynamic elements which have affected the people of Nottinghamshire are due mainly to external influences. The most important of these elements relate to transport and trade. Transport developments within the county are almost entirely associated with the growth of railways. In the early years certain turnpike roads and the Erewash canal had a slight effect, but the coming of the railways led to such relatively stupendous changes that this slight effect is almost negligible.

Railways.—The progress of the railways of the county is illustrated by the maps in Fig. 15. These maps are based upon information contained in 'Bradshaw's Railway Guides,' which have appeared regularly since 1842, and attention has been paid to the facts set out in the authoritative histories of the railway companies, particularly in the cases of the Great Northern Railway and the Midland Railway.

Great railway progress was made in the period from 1842 to 1851. Steady progress followed until 1881; and since that year development has been confined to lines eastwards from Chesterfield. By 1891 alternative routes connected Chesterfield with Mansfield, and by 1901 a new route across the county went almost due east from Chesterfield through Tuxford to Lincoln.

The maps indicate progress in mileage, and may be taken as indicative of progress in communication solely on the assumption:—railway lines are used to the extent which the development of the districts which they serve demands. This implies that the traffic on a mile of line in 1901 is relatively of as much proportionate importance to the community as was the traffic on a mile of line in 1851. This assumption may be wide of the mark, but it would require a separate investigation to determine the value of a mile of line to the county at the successive census years: and until such an investigation be made, it may be useful to assume the truth of the above proposition as a general statement of tendency. Consequently, the progress indicated in Fig. 15 means at least

the introduction into the county of a growing, *i.e.* dynamic, force which would profoundly modify the distribution of the population.

The main purpose of many of the lines constructed in the county

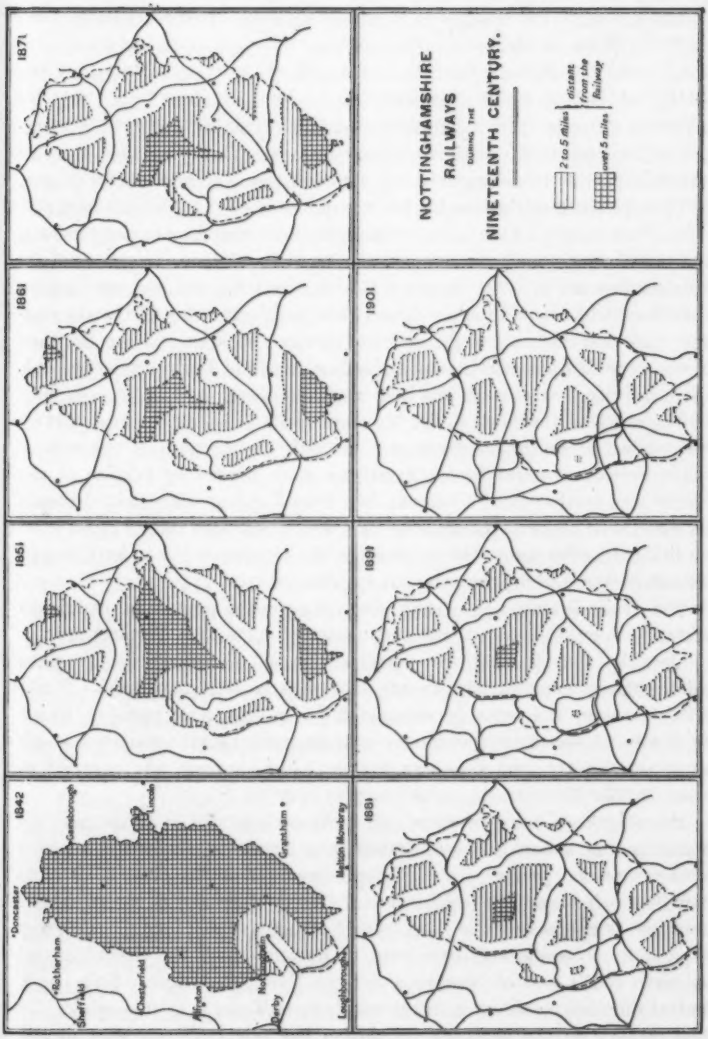


FIG. 15.

has been to facilitate the traffic in coal between London and the coalfield of Nottingham and Derby. Much of the strife which marked the early

progress of the Great Northern and Midland railways was due to a desire to capture this traffic for one or the other company.

Ignoring the duplication caused by lines which run side by side, and ignoring, also, the growth from single to double tracks, and later from double to quadruple tracks, and taking account of those railway lines which intertwine with the county boundary, it is possible to show partially the progress in railways which has occurred. In the last half-century the mileage of land covered by at least a single track has risen from 120 miles in 1851 to 250 miles in 1901, but the proportion of this mileage to the population of the county has remained almost constant. Throughout the railway period, each mile of railway track has corresponded to about 2000 people.

Perhaps the most interesting feature of the maps is the large triangular piece of the middle of the county which was last crossed by railway metals. The middle portion of the county, the "rail-less" land, was crossed by the main line of the Great Northern Railway by 1861, and was cut by lines from Mansfield first to Southwell and then to Worksop by 1881. In contrast with this district lies the district between the Leen and the Erewash in the general direction from Nottingham towards Derby and Sheffield, where railway development has been continuous and rapid.

The areas of the land which lay more than 5 miles from the railway have shown a continuous decrease: in 1851, 12 per cent. of the county was more than 5 miles from the railway, and in 1901 no portion of the county was further from a railway line than 5 miles. A steady decrease has also taken place in the areas of land which lies more than 2 miles from the line. In fifty years, the percentage of the county placed at this disadvantage has declined approximately from 30 to 20.

The dynamic action of railway progress upon the population is demonstrated in all the curves which show rates of increase. Throughout the county, the districts and the parishes changed in population at rates which differed but slightly from one another from 1801 until 1851. From 1851, however, the rates of increase differ much more, parishes which previously increased then began to increase more rapidly, parishes which developed slightly then began to decline. For example, the parishes in group M may be contrasted with parishes in group Y.

From another point of view, the dynamic effect of railways may be seen in a comparison between Retford and Newark. Retford is a nodal point where the present Great Central line crosses the Great Northern main line. Newark is a similar nodal point where the Great Northern main line is crossed by the lines from Nottingham to Lincoln. Progress in population has been greater west of Retford along the Great Central line than south-west of Newark along the Nottingham line. This Great Central line crosses the area in the northern half of the county where the chief increase in the northern population has taken place. Most of the railway lines in the east and north cross the county in order to connect districts of great importance which lie outside Nottinghamshire. These

lines cross the truly farming parishes, where the population has but slightly improved since the advent of the railways; consequently, it may be assumed that the dynamic effect of these railways has not tended to progress in population.

The year 1851 marks an epoch in the progress of the population. Railways provide improved facilities for movement, so that men may more easily remove their homes elsewhere, and farmers may more easily obtain casual labour in times of stress, such as the season of harvest. Railways, also, improve the speed at which knowledge spreads, as well as facilitate the provision of better farm implements. For these reasons the people of the farming parishes have tended to migrate. On the other hand, in the colliery parishes railway development appears to have kept pace with the rapid growth of population.

In connection with the fact that population tends naturally to increase, the area of rail-less land is of interest. It may be assumed that by natural growth, the population in any district should have been in 1901 about three times as great as in 1801; this estimate is purposely kept low. Yet the parishes in the rail-less area show on the whole a tendency towards absolute decline in numbers of inhabitants.

Without straining the facts too greatly, it may be concluded, therefore, that the provision of railway communication has tended to keep population at least steady, unless some other industry has arisen in the locality in addition to farming.

Canals.—The dynamic effect of canals upon growth of population has been confined in Nottinghamshire to the pre-railway period and to one district, the Erewash valley. Details as to the coal mined and handled in Nottinghamshire alone cannot be disentangled from those for the whole Erewash valley, but the facts for the entire district are instructive.

In 1803, the coal-owners of the Erewash valley sold 254 thousand tons of coal. Shortly after the commencement of the railway period (in 1851), their sales had increased to 586 thousand tons; in 1861 over 1½ million tons, and in 1871 nearly 2 million tons were sold. In the twenty years, from 1851 to 1871, the sales of coal had more than trebled.

Before 1841, the traffic was entirely by canal. In 1851, 57 per cent., in 1861, 14 per cent., and in 1871 but 8 per cent. of the traffic was by canal; the remainder went by rail. Part of the decline in canal traffic since 1851 is, however, due to the opening of pits which were not near the canal and which were entirely served by railways. The more direct competition between the railways and the canal is shown by the facts that in 1861, six collieries belonging to one firm mined 194 thousand tons of coal and despatched 28 per cent. by canal; and three collieries belonging to another firm yielded 124 thousand tons and sent 17 per cent. away by canal. These nine pits produced five-eighths of the total coal of the Erewash district, and nearly a quarter of their product went away by the canal. At the present time canals carry a small portion of the coal.

Canals have, therefore, had little effect upon the growth of the population.

Farming.—The static effect of the rock structure upon the farming population has already been estimated; but the fluctuations in the crops and animals which appear in the tables in the Appendix obviously signify that some dynamic agency has influenced the agriculture of Nottinghamshire. It will be well to attempt to estimate this dynamic agency. During the nineteenth century, the farmer in England gradually became interested in farming operations over the whole world. The paucity of data prevents any attempt to estimate dynamic influences before 1870, and the inherent defects in the data for that year make it advisable to treat the values for 1870 with some caution.

The price of wheat in England since 1881 may be regarded as a world price, the result of the supply and demand of the world as a whole. Consequently, it is possible to demonstrate that wheat production on the average in the United Kingdom, since 1881, has been a response on the part of the British farmer to world conditions governing the growing of wheat. The acreage and the quantity of wheat grown in the United Kingdom has declined since 1881,* but the relative yield of an acre of wheat land in Britain has remained practically constant since 1881. Consequently, the British farmer has responded almost perfectly to the conditions which cause changes in the world supply and demand for wheat. These conditions illustrate the dynamic factors which affect British farming; and, as the relative yield per acre of barley and oats has also been constant, it may be assumed that the production of other cereals and the rearing of farm animals in the United Kingdom is influenced similarly by world supplies.

England and Nottinghamshire have retained a constant proportion of the wheat acreage of the United Kingdom, so that both areas on the whole have been uniformly affected by world conditions.

In the seven groups of parishes, the acreage of wheat-land has varied considerably: except on the Keuper and the coal-measures, wheat production has declined in importance relative to the average for the county. On these two formations, wheat-land has become more important than the average. The proportion of wheat-land in the parishes on the coal-measures is so small that it may be neglected. Consequently, it is concluded that world changes in wheat production have caused the small areas in Nottinghamshire which lie on the margin of cultivation for wheat to cease to produce that cereal, while the good wheat-lands have increased their yield. The wheat farmer on the poor wheat-lands has declined in importance, and has increased in importance on the good wheat-lands solely because of the dynamic effect of world changes. In 1870, the parishes on the Keuper marl contained 3 per cent. of the wheat-land of

* *Vide* the paper by Dr. J. F. Unstead, read before the Research Department, *G. J.*, Aug., Sept., 1913.

Nottinghamshire, and the proportion in 1901 was 4 per cent., which is a relative increase of over 30 per cent. During the same period, the proportion of land devoted to wheat relatively declined on the Bunter and the Lias by 30 per cent. and 50 per cent. respectively. The Keuper has already been noted as the best wheat-land. Similar analysis in regard to barley, sheep, etc., tends to show that the farmer in Nottinghamshire has been affected for the other products in the same way as for wheat.

For example, sheep are most easily and profitably reared upon the Bunter, and sheep rearing has improved most upon the Bunter.

The net effect of the dynamic forces has been to improve the position of the farmer who produced a crop most easily, and to make matters more difficult for the farmer who produced a crop only with difficulty. Consequently, the areas of arable land in the parishes in Nottinghamshire have declined. This fact has influenced the people and accounts, to some extent, for the migration of the rural population.

World changes in agriculture have therefore had an effect upon the population similar to that of the railways. Attention has been concentrated upon a relatively smaller area of land; the farmers who have been favoured by their situation have progressed, but the many farmers who farmed relatively unsuitable land in the early part of the century have had to let some of their land go out of cultivation. The rural parishes, therefore, have tended to decline in population.

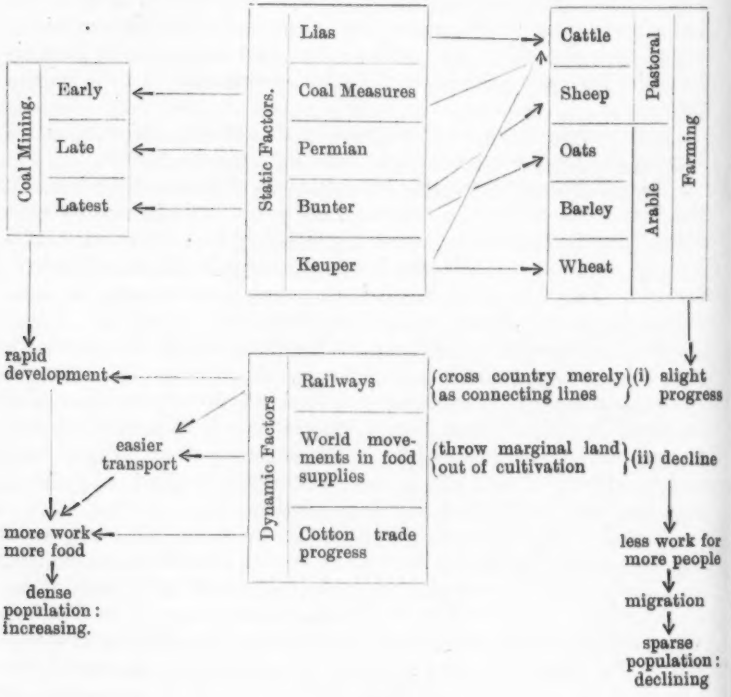
Factories.—Nottinghamshire in the neighbourhood of the county town has been noted throughout the century for its manufacture of hosiery. In Farey's noted 'Survey of Derbyshire (1811),' mention is made of the stocking-knitters who lived on the Nottinghamshire slopes of the Erewash valley and of a cotton spinning mill north-west of Mansfield. This was in 1811. The separate Census reports call attention in various years to the growth of the population in definite parishes as a direct consequence of the successful working of factories for hosiery and silk. As a rule, these parishes are situated upon the coal-mining lands, so that part of the rapid growth of population in the coal-mining parishes is due to the factories.

Nottinghamshire exemplifies the close relationship which exists elsewhere in the United Kingdom between the factories and the coalfields.

Summary.—Three areas may be distinguished in the county of Nottingham, where the growth of the population has been due to different factors. These areas are: (i.) the densely-peopled south-west; (ii.) the sparsely-populated east and north; and (iii.) the district near Retford and Worksop intermediate in situation and intermediate in development. The changes in this third district have been omitted from the diagram below, in which the fluctuations in the two extreme districts have been summarized.

It is hoped that this investigation into the detailed circumstances which have affected the fluctuations of the population of Nottinghamshire during the nineteenth century has laid bare the geographical factors in

the environment which have combined to produce the county of Nottingham as it exists to-day.



APPENDIX.

Tables showing the Relation between Agriculture and Rock Structure.

Groups of parishes on—

X = the Bunter lowlands.
Y = the Bunter highlands.
H = Keuper marl near Retford.
K = Keuper marl near Nottingham.
L = Magnesian limestone.
R = Lias.
S = Coal-measures.

[The numerical facts expressed in these tables have an intrinsic importance in addition to their immediate value for the present inquiry. The quantities are, consequently, published *in extenso*, as they provide evidence which has not hitherto been available of the effect of rock structure upon farming, and thus of the reaction of man to his geological environment.]

Group.	I. Area of Cultivated Land as a percentage of total area.				II. Area of Grass (permanent and rotation) as a percentage of area cultivated.				III. Area of Grass (permanent and rotation) as a percentage of total area			
	1870.	1881.	1891.	1901.	1870.	1881.	1891.	1901.	1870.	1881.	1891.	1901.
X	88	99	97	98	34	36	43	43	30	36	42	42
Y	77	86	84	80	36	43	50	46	28	37	42	37
H	62	69	71	71	46	50	54	57	29	35	38	40
K	89	86	91	94	53	57	59	60	47	49	54	56
L	79	78	79	78	44	51	55	58	35	40	43	45
R	86	91	90	91	59	70	85	87	51	64	77	80
S	91	93	88	92	70	73	80	81	64	68	70	75

Group.	IV. Area under Wheat as percentages of arable area				V. Area under Barley				VI. Area under Oats				VII Area under Turnips grasses.			
	1870.	1881.	1891.	1901.	1870.	1881.	1891.	1901.	1870.	1881.	1891.	1901.	1870.	1881.	1891.	1901.
X	36	28	22	12	23	22	24	23	4	9	17	22	24	27	26	27
Y	18	13	5	7	23	21	21	23	17	25	34	35	32	32	30	29
H	34	28	31	24	18	22	17	22	4	9	10	10	10	10	10	12
K	26	29	28	23	22	27	25	26	4	6	6	14	13	15	20	19
L	26	21	24	18	25	26	25	25	12	15	17	23	21	22	20	20
R	36	31	33	24	17	13	10	9	12	15	15	23	8	5	13	17
S	32	32	32	32	17	13	10	6	17	23	31	28	9	12	15	14

Group.	VIII. Area under Wheat, Barley, and Oats as percentages. Sum of IV., V., and VI.			
	1870.	1881.	1891.	1901.
X	63	59	63	57
Y	58	59	60	65
H	56	59	58	56
K	52	62	59	63
L	63	62	66	66
R	65	59	58	56
S	66	68	73	66

Group.	IX. Numbers of Cattle per thousand acres of				X. Numbers of Sheep grass of both kinds.			
	1870.	1881.	1891.	1901.	1870.	1881.	1891.	1901.
X	276	286	293	249	1740	1680	1830	1740
Y	176	167	157	145	2390	2500	2090	1390
H	456	405	425	390	1080	416	394	440
K	407	450	431	415	875	425	595	440
L	322	291	326	284	1130	670	630	430
R	342	309	306	315	985	174	520	375
S	365	295	320	270	528	110	425	243

EARTHQUAKES AND THE PANAMA CANAL.

By CHARLES DAVISON, Sc.D., F.G.S.

JUST as the Panama canal is approaching completion, we learn of a series of earthquakes in the Isthmian zone strong enough to cause reasonable fears with regard to the safety of the canal workings. During the last two months three shocks, among a number of others, have attracted serious attention, though no damage has yet been done to the locks and dams of the canal. The first occurred on October 1, at about 11.25 p.m. The shock, according to a dispatch received from Sir C. Mallet, Minister-Resident at Panama, lasted for about twenty-five seconds, and is said to have been the strongest felt in the district for more than thirty years. The needles of the seismograph at Ancon, after recording a trace of 3 inches in amplitude, were thrown off the paper, but, on returning, continued to register vibrations for an hour and a quarter. From this record it would appear that the distance of the epicentre was about 115 miles from Ancon. A few walls in Panama City were cracked by the shock, but the chief damage occurred in the province of Los Santos, which is about 100 miles from the canal. At Tonosi most of the buildings were partially destroyed. As slight tremors, preceded by a rumbling noise, were felt there daily during at least the first half of October, it is probable that the origin of the earthquakes was not far from that place.

The other shocks seem to have been of much less strength than that of October 1. The second occurred on October 23 at 10 a.m., and the third on the morning of November 13. Both were felt in the Isthmian zone.

The question raised by these earthquakes—whether future shocks may be strong enough to injure the canal works—is one of great importance, and it is unfortunate that the fears which have been entertained cannot be allayed entirely, though it would on the whole seem probable that the prospect of serious damage is but slight.

(i.) The principal reason for this view is the well-known one of the immunity of the canal zone from violent earthquakes in the past. Since the Spanish conquest, only two earthquakes, besides that of October 1, have attained a semi-destructive character.* On March 2, 1621, many houses in Panama were injured by an earthquake; and, again, on September 7, 1882, houses, bridges, etc., were damaged at Panama, Gatun, and Colon, that is, at different places across the whole isthmus. The argument should not, however, be pressed too far, for earthquakes sometimes recur in the same place at prolonged intervals. We know, for instance, of no strong earthquake in the Colchester district before 1884,

* F. de Montessus de Ballore, 'Tremblements de terre et éruptions volcaniques au Centre-Amérique,' etc., pp. 1-293, Dijon, 1888.

and of few shocks of any kind in South Carolina before Charleston was partially destroyed in 1886.

(ii.) A second reason has been suggested by Mr. D. F. MacDonald, geologist to the Isthmian Canal Commission, in a paper published in the *Scientific American* for October 18. He points out that, as earthquakes are generally due to fault-movements and occur in mountainous districts, and as few faults of any consequence are traversed by the canal, and all mountains are at some distance, the Isthmian zone is one in which strong earthquakes are not likely to occur. The argument deserves consideration, but it should be remembered that our knowledge of the superficial structure is not sufficient, for earthquakes originate as a rule at some depth (it may be a few miles) below the surface. Geological surveys in mining districts reveal the fact that faults exist at the depth of the mines which the surface survey would never have made known. Moreover, some earthquakes, such as the Carlisle earthquake of 1901 and the Swansea earthquake of 1906, prove that there are deep-seated faults of which the surface structure affords not the slightest indication.

(iii.) Lastly, even if severe earthquakes were to occur within range of the Isthmian zone, it does not follow that the canal works would sustain serious harm. The late Prof. Milne was the first to discover that earthquake-motion at the bottom of an artificial pit is much less intense than on the adjoining surface,* and the elaborate observations made by his pupils, Profs. Sekiya and Omori, fully bear out his conclusion.† They showed that the intensity of a strong earthquake shock depends less on the large undulations than on the small and very rapid vibrations or ripples, and that, at the bottom of a pit 18 feet deep, these ripples are to a great extent smoothed away, so that the resultant intensity of three strong earthquakes within the pit was only about one-sixth of that on the free surface.

It thus seems to follow: (i.) that, judging from past experience, it is probable, though by no means certain, that no violent earthquakes will occur so near to the canal as to injure the works; and (ii.) that, if a strong earthquake did so occur, the maximum injury to the works would be wrought near the surface; though it is possible, and indeed probable, that, in such a case, there might be extensive land-slides from the sides of the cuttings, especially if the earthquake occurred after a prolonged period of heavy rains.

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* *Japan Seis. Soc. Trans.*, vol. **10**, 1887, pp. 1–36.
† *Ibid.*, vol. **16**, 1892, pp. 19–45.

THE RUSSIAN HYDROGRAPHICAL EXPEDITION TO THE NORTH OF SIBERIA: THE NEW LAND.*

THE Russian Hydrographical Expedition to the Nort[illegible]olar ocean, consisting of the two ice-breakers the *Taimyr* and the *Vaigach*, under the command of Commander Vilkitski, set out on August 4 from Anadir bay, north-east of Siberia. On the 6th they turned Cape Dezhnef, and the icebreaker *Vaigach*, under the command of Lieut. Novopashenni, was sent northward to reconnoitre the state of the ice. On his way westward along the shores the *Taimyr* met heavy ice, and only on August 9, near Cape Shellagsky, it found open water. Profiting by this, the Commander made a hydrographical survey of Chaun bay, and found it to average 9 fathoms deep. On August 12 the *Vaigach* made its way through the ice to Wrangel Land, which it could not approach nearer than 10 miles.

On August 15, at the meridian of Cape Baranof, both ships found open water. The *Vaigach* continued its way along the shore, making soundings, and the *Taimyr*, under the command of Commander Vilkitski, began an oceanographical section to the north of the New Siberian islands. On August 20 he discovered, to the north-east of the New Siberian islands, a small island, on which the Russian flag was hoisted. On August 21 the ship took its course in a great circle to the Taimyr peninsula, which was reached on August 23, in the latitude of 76° N. No such land as the supposed Sannikof Land was seen. On August 23 the two ships joined at Preobrazhenie island.

During this time the *Vaigach* surveyed some coast east of the Lena, and on August 21 began the survey between the Olenek and Anabara rivers, but the ice obliged it to leave the shores, and for some time the ship was unable to continue its work near the Khatanga mouth.

On August 24 the *Taimyr* began the survey of the east shores of the Taimyr peninsula northward, and the *Vaigach* surveyed a large bay in 75° 30′ N. Fifteen miles out the ship grounded and summoned the sister ship to her aid by wireless. After getting her afloat both ships surveyed St. Thaddeus bay and the islands there, fixing several points astronomically. On September 1 the expedition reached Cape Chelyuskin, and found their way barred by unbroken ice, which obliged them to go north-east; 30 miles to the north they came upon a long narrow island extending along the parallel, about 7 miles wide. Passing round this new island to the east the vessels steamed north-west, and after 30 miles discovered the shores of a new high land with glaciers; the soundings gave about 100 fathoms at a distance of 7 miles from the shore. On September 4 the expedition landed on the north coast of this island, and the Russian colours were hoisted near a point in 80° 4′ N., 97° 12′ E.

After having surveyed 20 miles of these unknown shores, the expedition tried to find a passage to the north and reached 81° N., 96° E. From

* Communicated by General J. de Shokalsky. See map, p. 467, Nov. *Journal*.

this position the new shores were not visible, and the soundings gave from 16 to 100 fathoms. The ice became heavier and heavier, and no passage could be hoped for there, so the expedition was obliged to turn back. On September 6 the ships were at Cape Chelyuskin, but the state of the ice there was unchanged, and the expedition reached the south shores of the new narrow island and waited there till the 10th, hoping that the coming gale might get them out of the ice. On this date the *Taimyr* returned to Chelyuskin, where the east wind broke up the ice a little. In order to determine the breadth of the ice barrier a sledging party was sent out. On September 11 the *Vaigach* returned from the new island because the ice began to accumulate along its shores. By boring the ice was found to be not thicker than 3 to 4 feet. The foot party came to the shore of Chelyuskin near the cairn set up by *Zaria* expedition, and erected a cairn at the cape itself. They inspected the ice-field for some distance, but could not see open water; probably the breadth of this field was about 40 miles. The icebreakers made only 5 miles in a day's work.

The difficulty of coal, the need of cleaning the boilers, and the lateness of the season obliged the expedition to turn back. On September 13 the ships proceeded to the east by the great circle route; during three days they met some belts of ice, the southern points of which they rounded. On September 18 Bennet island was reached, when on the *Taimyr* the coil of the condenser broke and the water in the boilers became salt. The wind blew heavily from the south and obliged them to shelter behind Bennet island. A party was landed and secured the late Baron Toll's collections, and a cross was erected on Cape Emmelina in his memory.

On September 22 the wind became lighter, and the expedition surveyed the island and started south. It was intended to take the great circle route to Wrangel island, but the heavy ice obliged them to go by zigzags about 300 miles along the meridian of 160° E. Sometimes the ships met new ice, and it was very difficult to pick their way during the darkness of the nights. On September 25 they came to open water, and immediately trawled for zoological purposes.

The next day the expedition met the ice up to the meridian of the Chaun bay, but the water was open from 70° N. and the 180th meridian. On September 29 the ships reached Koluchin bay and surveyed it. They started on October 3, but a heavy gale compelled them to anchor; the route was then continued to Cape Dezhnef. On the 22nd it was passed, but 40 miles from Providence bay a heavy storm caught the ships, which rolled about 55°, and the speed against the wind was not more than half a knot. In the night the tiller-rope on the *Taimyr* broke, and only the next night could the ships approach the shores of St. Lawrence island. On October 9 the expedition was at St. Michael's Fort, and on October 27 at Petropavlovsk in Kamchatka, from which this report was sent by wireless.

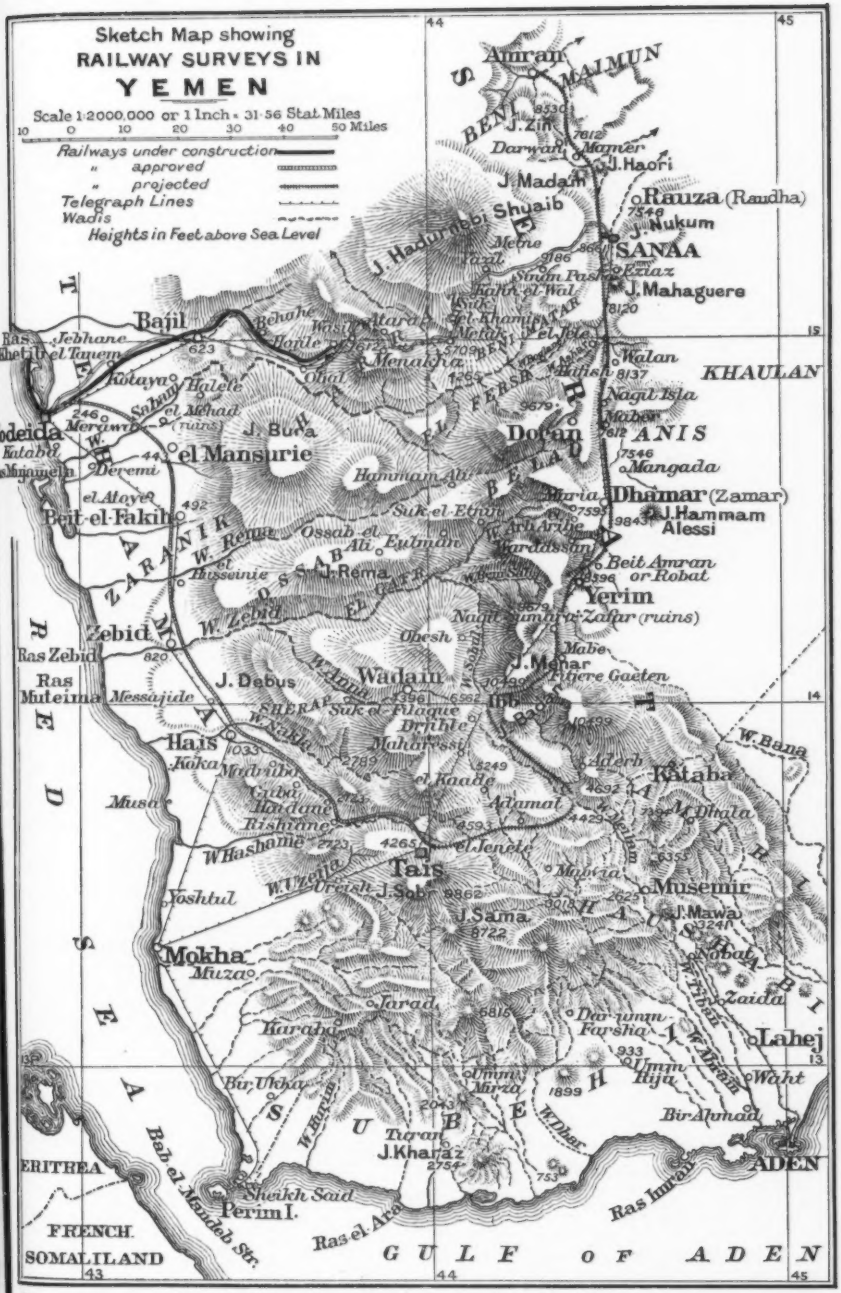
RAILWAY SURVEYS IN THE YEMEN.

So little has been done in the way of survey work in the interior of Yemen that any one who lifts the veil for us in this part of Arabia is accomplishing a feat of unusual geographical interest. In *La Géographie* of October 15, M. Beneyton describes an interesting tour to prospect for railways from the coast inland which the Turkish Government proposed after the revolution in 1908, the lines to be constructed under a concession with a French company. A line leading directly from Hodeida to Sanaa was first proposed, the ascent through the hills to the capital to be made along the Wadi Fersh, an inhospitable district, the main chain of Serat being crossed at 8038 feet. This was not accepted entirely, but a line across the coastal plain through Bajil and among the lower hills as far as Hajile, which lies at the foot of the steep crags on which is the castle of Menakha, was sanctioned, and is now almost completed. Menakha is an important strategic position nearly halfway between Hodeida and Sanaa. The trace of another and much longer line was surveyed, also starting from Hodeida, but making a deep U-shaped loop to the south and passing not far from Kataba on the frontier of the British Aden Protectorate, before turning north to Sanaa, which would be passed to reach Amran still farther north.

The proposed line would run through Beit-el-Fakih Zebid, Hais, Tais, Ibb, Yerim, Dhamar and Maber to Sanaa, this project being ultimately approved by the Turkish Government. In this project the main chain of Serat will be crossed at 9843 feet at the col of Fitjere Gaetan. Although essentially a mountain railway, the gradients will not exceed $\frac{1}{40}$, and the curves will not be greater than 109 yards radius. The actual port would not be Hodeida, but an inlet a few miles north of it known as Jebhane, where the terminus and quays would be made. A considerable amount of survey work, mostly on a scale of $\frac{1}{50000}$ with some on $\frac{1}{20000}$, was done on either side of the proposed trace with the usual surveying instruments, and much unexplored country was mapped. This was only done with the aid of an escort of 850 infantry and a troop of cavalry, work being varied by an occasional skirmish. M. Beneyton gives some interesting details of the general formation of the western Arabian hills in the Yemen.

Between the Red sea coast and the foot of the hills is the Tehama, a strip of nearly level ground 39 to 50 miles wide of coral formation and alluvium. The western hills extend inland for another 60 to 90 miles, rising to the main central chain of Serat, the slopes being very steep and covered with a shell or crust of basaltic formation.

The summit plateau of Serat, 35 to 60 miles in width, is marked by a line of craters which have covered the western slopes with lava and basalt, while in the foothills along the edge of the Tehama emerge a number of sharp peaks of pyramidal shape also of basalt. But while on the western slope sedimentary formations are rare, on the eastern side they become very apparent, and the long gradual slope here is mainly of alluvium perhaps for 60 to 120 miles, embracing a country still very fertile, but decayed from its former state of splendour as recounted by ancient writers. The country is seamed with dykes of basalt of a uniform thickness of about 3 feet. In some cases these are apparent as a straight wall, to all appearance artificial, and some miles in length. The "organ-pipe" formation of basalt is repeatedly met with; between Maghreb Anis and the Wadi Arh is a remarkable gorge or narrow rift showing this formation to a height of 250 feet.



The region north of Tais is taken from M. A. Beneyton's sketch map, based on his route traverses (see *La Geographie*, Oct. 15, 1913). All to the south of this is from the map of Arabia and the Persian Gulf, by Capt. F. F. Hunter, I.A., of the Survey of India, 1908.

The line of craters along the axis of the Yemen plateau is continuous; and between Amran and Sanaa a great number were apparent, the Jebel Zin, Jebel Madam, and Jebel el Haori being especially remarkable for their sharply defined features. In the centre of the Maber plain is another remarkable crater, and there are several between Maber and Dhamar, which latter town is built on the lava-flow of one of them. But perhaps the most typical is Jebel Hamman Alessi, some 8 miles east of Dhamar, which rises abruptly 1575 feet above the plain. A winding path leads to the summit, on which are some ancient constructions where patients came to take hot air baths from the sulphurous vapours emitted from the crater. The crater is 165 yards diameter and 55 yards deep, the rim being surrounded by a wall 15 to 25 feet high and 10 feet thick. Sulphurous vapour issues through crevasses in the crater, and crude sulphur can be collected there. The chambers for hot air baths can be traced. A cistern of ancient construction, the cement of which is in excellent preservation, supplied water. Local legend attributes the construction to the Himyarites, but possibly it may have been done during the Turkish occupation of the sixteenth century.

The rivers of Yemen are essentially torrents, containing water always in the hills, but sufficient to reach the sea only in flood time; at other times it is utilized for irrigation. Hot springs are numerous, the temperature sometimes reaching 164°, but they give excellent drinking-water without chemical admixture.

The heat on the Tehama or coast littoral is sometimes extreme. In May and September, during the period of calms, the thermometer varies between 95° and 110° Fahr., perhaps lower if rain falls; in winter it varies from 75° to 95°. On the plateau is a mild climate, varying in summer from 63° to 81° Fahr., and in winter from 23° to 85° Fahr., this latter variation sometimes taking place in a single day.

The population of Yemen is divided into two religious sects—the Zeidites, who occupy the plateau, and number 1,590,000, and the Shafiites, who live on the Tehama and outliers of the Serat chain, and number 3,000,000 according to M. Boneyton's estimate. The Zeidites consider themselves under the joint civil and religious authority of their Imam Muhammad Yahia, and are fanatical, intolerant, and averse from progress. The Shafiites acknowledge vaguely the supremacy of the Caliph of Constantinople, but actually they submit only to a very mild exercise of the authority of their sheikhs and cadis. They are milder, more tolerant, and more susceptible to modern progress, which they think will improve their wellbeing, than the people of the plateau. They are also more industrious, and their country more prosperous.

The Jews of the Yemen, formed in scattered colonies, are an important element in the development of the country; they supply the craftsmen, artificers, commercial men, labourers, and builders for the country, there being 3000 in the Kaa-el-Yahud at Sanaa alone.

All cultivation in the Yemen is in terraces, the object being to retain the water on the fields. One of the most important cultivations of Yemen is that of "kat" (*Catha edulis*), a bush, the buds and young leaves of which are extensively used for chewing; it produces a sustaining effect on the nerves, and is reputed to ward off the effects of hunger and thirst. It is said to contain tannin, and is cultivated at an altitude of about 6000 feet.

Strangely enough, although the country produces it, the Yemen Arabs drink little coffee, but rather a decoction from the plant known as "gueshir." Each coffee berry contains two seeds set in a pulp, and "gueshir" is prepared from the pulp, which has been first dried or baked. It is boiled with water, with the

addition of a few coffee pods, the liquor resembling very ...ng tea, naturally slightly sweetened.

The zone from 2200 to 5200 feet is generally covered w...h euphorbia of a cactus shape, some of them reaching a height of 30 feet.

While exploring the Wadi Zebid, the travellers encountered a tribe who practise vaccination on the arm, using some of the virus of a sick person attacked with small-pox as a vaccine. This remote tribe had no communication with the coast or with Turkish doctors, and had carried on this practice from time immemorial.

About halfway between Beit Amran (or Robat) and Yerim are the remains of an ancient dam of enormous blocks of lava and basalt, rising 10 to 15 feet, above the plain, although the inhabitants have removed some of the upper layers for building purposes. The natives ascribe a Himyaritic origin to these ruins, which is plausible, as Yerim was a very prosperous Himyaritic centre, and the place is near the ruins and troglodyte habitations of Dhafar (Zafar), which Niebuhr identifies with the Saphar of Genesis.

REVIEWS.

EUROPE.

A Scientific Geography of Europe.

'The Continent of Europe.' By Lionel W. Lyde. London: Macmillan & Co., Ltd. 1913. Pp. xv. and 446. *Maps, some coloured, and Diagrams.* 7*s.* 6*d. net.*

Prof. Lyde's book is a substantial contribution to geographical literature, and is, therefore, a book for regular use. Whether the author compels our agreement with his dicta or no, he is always definite, always interesting, and his statements are made with such a picturesqueness of phraseology, and such an incisive style, that they compel attention and stimulate thought. For example, in the opening paragraph of the chapter on the Iberian peninsula occurs the idea that the south-westward trend of Iberia faced a pathless desert or a pathless ocean; the reader may accept this or may disagree, but he cannot pass the statement by unnoticed.

Prof. Lyde has aimed at a double objective: first, to emphasize the essentially peninsular character of Europe; and, secondly, to describe the political units which compose the peninsula; for he writes in the preface, "I find it just as difficult to picture clearly the precise limits of a natural region—in Prof. Herbertson's sense—as I find it easy to picture the delimited frontier of a civilized State." He comments in the preface on his adoption of the theory of the tetrahedral deformation of the Earth as a working hypothesis; but he uses the work of Ripley on the races of Europe in connection with Nordic, Alpine, and Mediterranean men, without commenting on his belief, "in spite of all the physiologists," that man is able to transmit acquired characteristics (*Geogr. Journ.*, November, 1912, p. 483).

The book opens with a world-outlook; the position of Europe in relation to the world and in relation to the Atlantic ocean, the general character of the peninsula in relation to the marginal and mediterranean seas, the relief and climate of the continent with their several controls of life of all kinds are discussed in the early chapters. Then follow chapters on the main political units, first the

peninsulas Italy, Scandinavia, Balkania, and Iberia; then France and the British Isles, with a gradual passage eastwards from the Low Countries to Russia. The treatment of the separate countries is intentionally inconsistent, for the British Isles and Russia are only described in so far as they bear relation to the peninsularity of the area. The British Isles are controlled by the ocean, and hence the main feature of the chapter devoted to them is the description of the ten great ports of these islands. Russia is continental, and thus largely outside the scope of the book; the country is summarized in the final paragraph thus: "What does the future hold for these people, so intensely religious, so lacking in initiative, so much at the mercy of a tyrannical land, with a tyrannical climate, in which political or priestly tyranny is an unavoidable incident? . . . And they must be still for ages foredoomed victims of any demand for blind obedience—from a foreign Jew as middleman, or a Slav fanatic as president of a secret society, or German Romanoffs as rulers. And it is these millions that form a frontier to all that is really Europe."

Prof. Lyde is equally definite and picturesque in his estimates of other political units, whether large or small; his summaries of Macedonia or Transylvania are crystalline in their clarity and precision. He lays more stress on the word-picture than on the map or diagram; he repeatedly provides cross-references to the text, while direct references to the illustrations are infrequent. It thus happens that the book is not self-contained; the student who attacks its closely packed argument will feel the necessity of a reference library and a well-equipped map-room; there are so many occasions when he will desire to investigate the bases of the concisely stated conclusions. The book is, therefore, one to be worked with, one to refer to, one to attack piecemeal, and a first judgment of it is necessarily confined to general impressions of the argument as a whole.

It is an apparent defect of many small geographies which are based upon historical development of areas that some at least of the conclusions are not necessarily due to more than accidental conjunction in place or time, as the writers appear to jump to the conclusion that there is a causal connection between the facts they state and the conclusions which they enunciate. The careful reader of such books at least feels doubtful of the validity of the conclusions and leaves the matter in abeyance because the book he is reading is too small in size to include the details of the argument. Prof. Lyde's book, though larger, at times, gives a similar impression. In the first place, the historical method appears to leave out of account the profound influence of the world's great men. What is the geographical significance of a Napoleon, a Pitt, or even a Kelvin? How much of the altered condition of the world which could by such men be legitimately laid down to adaptation to environment? In a single lifetime so great a man accomplishes more towards modification in Europe or in the world than is accomplished in generations of ordinary men living their little lives within the controls of relief and climate.

Secondly, the impression lingers that the treatment of environment is too static; environment and control appear to be regarded as wholly constant, wholly steady, forever influencing human progress with the same intensity. The estimate of Italy should vary under the circumstance that the Mediterranean is *the sea*, or one of the two great seas; or, an international highway. Sometimes Italy is a terminus, at others but a calling-place, or a land of transit. As the centre of the known world, or even as the centre of traffic in the great sea, the relief and climate of Italy have a different importance from their comparative insignificance when they lie on a back-water, or as side-tracks

off a great high-road of commerce. From another point of view, the progress of human achievement makes the relief control of the Alps a totally different matter in these days of railways and electricity from what it used to be less than a century ago. There are dynamic factors in environment which profoundly affect the insistence of its control of human activity; and not the least of these dynamic factors has been the stimulus which is summarized as the Industrial Revolution of the late Eighteenth Century, or the second stimulus based on coal and communications which may be summarized as the Commercial Revolution of the late Nineteenth Century. Man's successes in his conflict with nature, won at an ever-increasing speed, tend steadily to relieve in varying proportions the control, the inhibition, which relief and climate lay on human endeavour. An illustration of this point occurs in connection with Prof. Lyde's comparison between the British and the Danish farmer. He quotes quantitative facts to demonstrate the superiority of Denmark, blames the British farmer for an "invincible superstition that cows can be kept only on good grass-land," and asserts that a well-organized dairy industry is the best possible way of keeping people on the land and the most profitable way of using the land; and this follows the declaration that in environment of position, soil, and climate, the British farmer is at no natural disadvantage. Statically the environments may be equivalent, but dynamically there is a tremendous difference. The Industrial Revolution is responsible for the fact that the ratio between the numbers employed in industry and those employed in agriculture is greater in the United Kingdom than elsewhere in Europe; and the rural depopulation of England which is implied by this fact occurred chiefly between 1851 and 1881 as a consequence of the superior attractiveness of industry as a means of earning a living, for the labourers left the land when agriculture was prosperous. Since 1881, the rural exodus is more closely related to changes in the methods of cropping, for the decline in the percentage of male agricultural labourers out of all those employed in agriculture is precisely measured by the decline in acreage of arable land. The superior returns to the Danish farmer are therefore the result of the Commercial Revolution which has tended to force the British farmer out of the business, for decline in arable acreage is largely the result of prairie farming and successful attempts to transport prairie farm products cheaply to the British Isles; at the same time this very improvement in transport has facilitated progress in Denmark—witness the fact that Denmark's chief imports are coal and feeding-stuffs. The dynamic factors in the environment are also the chief reasons why there is hope for Russia. Prof. Lyde dwells on the tyranny of the land, but the Russian farmer, while he has made no relative progress, has certainly kept pace with farming progress in all other parts of the world. His average yield per acre of ground tilled is steadily about two-thirds of the average yield of the whole world for similar crops, but he has maintained this ratio persistently throughout three decades, while the average yield for the whole world has increased in some cases by at least 20 per cent. Communication facilities are the keynote not only of the Commercial Revolution, but also of the factors which can lift Russia from out the slough of despond.

A final impression: Prof. Lyde provides an "outlook" over Europe and its relation to the world, as well as a searching "inlook" into the details of European geography, but side-look appears to be absent. His treatment of textiles will serve as an illustration. Among the detailed circumstances of each country wherever climatic conditions tend to exert a sufficient control, he notes rightly enough that textiles are manufactured. All these instances might be deduced

from the geographical law that, given a certain humidity of climate and a certain access to power supplies, some people would work at textiles. He even goes further than this, and prophesies that Norway will one day be one of the great textile producers of the world. But the factor of prime importance, once the first deduction has been made, lies in the relative value of the textile working in one area in comparison with that in all other areas. There is, for example, no measure of the importance of Germany as a textile producer in comparison, say, with Britain, and there is consequently no measure whereby one can estimate the validity of the prophecy with reference to Norway. Prof. Lyde similarly treats unworked minerals as important. The presence of economic minerals in the rocks of a country is of little more than potential importance to the economic geographer; such minerals have hardly risen to the importance of an element in the static environment. A look cast over other countries reveals their lack of value, but the dynamic circumstances which force men to mine such produce, or the absence of such a stimulus in the sum total of the geographical controls of a district, become valuable in reference to the final estimate of a country. Side-look is necessary to the quantitative measurement of geographical facts, and Prof. Lyde has not given us a quantitative account of the economic geography of Europe. Each political unit is brought into prominence largely for its own sake, and thus the chapters form a succession of self-contained studies of relatively small areas. No doubt this is due to the fact that the book is based upon a series of lectures.

B. C. W.

'The Story of Bradford.' By Margaret C. D. Law. (London: Pitman. [1913.] Pp. xii., 305. *Plans and Illustrations.* 2*s. net.*) Bradford possessed a fulling mill in 1311, and, like other towns in the West Riding, owed its cloth-making industry to the abundance of raw material obtained from the flocks of sheep kept by the great monasteries and abbeys. It does not, however, appear on the list of woollen towns till 1472. In 1780 Bradford was the chief centre of the worsted manufacture, but the town itself did not begin to grow till after the introduction of machinery at the beginning of the nineteenth century. Australian wool was first used in the town in 1828. The author gives an excellent account of hand-loom weaving and the great industrial changes.

'La France: Géographie Illustrée.' By P. Jousset. (Paris: Librairie Larousse. [1912.] Pp. iv., 390, 464. *Maps and Illustrations.* 56 *fr.*) This is an admirably illustrated monograph in two volumes. Among the most striking representations are the panorama of the volcanoes of Auvergne taken from the Puy de Dome, the deep gorge valley of the Tarn, the Pyrenees near Gavarnie, the forestation of the dunes in Arcachon, the Meije from la Grave, the vintage in Provence, and the valley of the Romanche. In Algeria the position of Constantine and the El Kantora Gorge are especially noticeable. In addition to a general account of the configuration, climate, and commerce of the several regions, there are detailed descriptions of the architecture and history of towns which will render the work of service as a general guide-book.

'Les Divisions Régionales de la France. Leçons faites à l'Ecole des Hautes Etudes Sociales.' By C. Bloch and eight other authors. (Paris: F. Alcan. 1913. Pp. 260. 5*s.*) An interesting chapter calls attention to the industrial and economic changes which have resulted from the introduction of railways which, like the roads, converge on Paris. Greater speed and cheapness of communication have tended to emphasize rather than obliterate the separation of one unit from another and to encourage specialization. Instead, however, of

isolation, this has led to the mutual interdependence of regions, and to the establishment of the remarkable commercial solidity of modern France. In the discussion of regions the influence of changes in communication on development is especially well brought out in Brittany. On the isolated farms of the poor land of the interior the peasants have adapted themselves to modern conditions wherever the roads and light railways penetrate. Instead of attempting to produce all necessaries on the land, they devote themselves to cattle and horses and the cultivation of oats and produce suited for fodder. A considerable number emigrate. On the coast, on the other hand, there has been little change in the economic life of the fishing population.

'Ravenna: a Study.' By E. Hutton. (London: J. M. Dent & Sons. 1913. Pp. xii., 300. *Maps and Illustrations.* 10*s.* 6*d. net.*) Though the natural route from Brundusium to Cis-Alpine Gaul, which was followed by the Flaminian way, was commanded by Arminium (Rimini), and not by Ravenna, the latter town possessed an impregnable position on a marsh which gave it great stragetic value. The author says, "Ravenna must always have been impregnable to any save a modern army, so long as it was able to hold the road in and out, and was not taken from the sea. Except in the first few pages, which explain the geographical position of Ravenna, the book is entirely historical.

'Vistas of Sicily.' By A. S. Riggs. (New York: McBride, Nast & Co. 1913. Pp. xii., 272. *Illustrations.* $1 *net.*) Innumerable are the travel books on Sicily, but there is certainly room for this vivid narrative of Mr. A. S. Riggs' experiences. This "isle of unrest," for thousands of years the cockpit of the Mediterranean, and the prey of most of the great nations in the world's history, offers a particularly fascinating field to the historical student. It is, indeed, rather surprising that no writer has seriously attempted to place the coping-stone, so to speak, on Prof. Freeman's "monumental fragment." One of the best features in the book is the introduction, in which the story of Sicily is skilfully condensed with a sound sense of literary and historical proportion. Another praiseworthy feature is the full and carefully compiled index.

ASIA.

The Antitaurus.

'Meine Vorderasienexpedition 1906 und 1907.' By Hugo Grothe. Vol. 2. Pp. xiv. and 318. Leipzig: Hiersemann. 1912. *Illustrations and Maps.*

This is the second part of Herr Grothe's publication of his explorations in Western Asia (a third is promised), and has the advantage of being almost entirely devoted to one comparatively small district, the limits of which are well understood. The region known, since Strabo at any rate, as the Antitaurus includes a group of parallel ranges rising to over 10,000 feet, which are projected northwards from the Eastern Taurus to join, and be absorbed in, the central Cappadocian plateau of Uzun Yaila. They confine the upper courses of the two main rivers which ultimately break through the Taurus to the Cilician plains. Though this area, as has been said, is generally understood by the name Antitaurus, it is a little difficult to say what actual boundaries to give it on the west, the north, and the east. Herr Grothe, however, is not troubled by this difficulty, since he confines himself to what he calls the Central Antitaurus, *i.e.* the northward-trending ranges, with their intervening valleys.

Of this highland district, with its remarkable medley of inhabitants, representing apparently survivals or refugee remnants of groups once much larger and more widely distributed, the author gives a very useful intensive study,

embracing physical geography, geology, ethnology, meteorology, zoology, and indeed almost everything which can be studied on the surface, except, perhaps, archæology. Not that he ignores even the last altogether. He speculates on the possible racial identity of the modern Avshars and an ancient "Hittite" population, and he marks ancient sites and Roman roads on his map. He has added very much to the value of his own account by giving very full references to his predecessors, whom, it is pleasant to notice, he treats with all fairness and respect. Excellent photographic views both of places and people, partly interleaved in the text, partly collected on plates at the end of the book, make the volume attractive as well as useful. Added to the description of Antitaurus are valuable tables of meteorological observations taken at seven stations which the author himself established in various parts of West Asia, from Marash on the northern limit of Syria to Babylon in Southern Mesopotamia (none, be it observed, in Asia Minor), and also a chapter on the "Art of Travel in Asiatic Turkey." Herr Grothe's wide and varied experience gives him the right to speak with authority on the latter subject; but when one reads such chapters as his, one always feels, if one knows anything of the diversity of conditions in different parts of Asiatic Turkey, and of the rapidity with which these conditions can change even in the "immovable East," that they amount to little more than records of one traveller's experience, and not to over-faithful records even of that, if their authors indulge much in generalities. Rules which have too many exceptions cease to be rules, and the rule of one district in 1906 does not necessarily hold even for that district in 1913, still less for other districts.

Old Madras.

'Vestiges of Old Madras.' By Colonel H. Davison Love, R.E. [Indian Records Series.] Published for the Government of India by John Murray. 1913. 4 vols. 36*s. net.*

In these sumptuous volumes Colonel Love has traced the history of the city of Madras from its foundation in 1640 to the end of the eighteenth century, paying particular attention, he tells us, "to the growth of the town and its fortifications, to the origin and development of local institutions, and to the manners and mode of life of the inhabitants." Based as it is upon the Government records (from which copious extracts are given), supplemented by a zealous study of all other available sources, the work will at once take its place as the standard authority on the subject, and it is difficult to imagine that so interesting and painstaking a compilation will ever be superseded. To his long experience of Madras and to his expert knowledge as an engineer, Colonel Love adds unwearied industry and a passion for accuracy that have resulted in a model treatment of his subject; and the work he has produced is in every way worthy of the important series to which it belongs.

The volumes are fully illustrated with portraits, facsimiles, etc.; and a special word of praise is due to the maps and plans of Madras and its neighbourhood. There is a very full index, occupying the whole of the fourth volume.

A French Appreciation of Burma.

'Burma under British Rule.' By Joseph Dautremer. (Translated by Sir J. G. Scott, K.C.I.E.) London: Fisher Unwin. 1913. *Map and Illustrations.* 15*s. net.*

M. Dautremer's exhaustive account of British rule in Burma should be gratifying to Englishmen, and especially to Anglo-Indians. Taken as a whole, the book may be regarded as an eulogy of our administrative methods in India,

though the author occasionally indulges in very frank but instructive criticism. Certainly, M. Dautremer finds more to praise than to blame. Comparing the personnel of the Administration of French Indo-China and Burma, the author very decidedly upholds the British methods. An English administrator is not merely a bureaucrat chained to his office, but goes about among the natives, and takes plenty of exercise. Consequently, there is a smaller proportion of officials on the sick-list. Then M. Dautremer approves of the greater continuity of the higher officialdom which obtains in British colonies. But it must be admitted that the author's views on the French colonies being represented in the National Assembly are decidedly early-Victorian. In fact, he regards a colony as a conquered territory to be exploited for the benefit of the Mother-country.

The outspoken and uncompromising introduction by Sir J. G. Scott is not the least valuable feature of a very useful book.

E. A. R. B.

'A Camera Crusade through the Holy Land.' By Dwight L. Elmendorf. (London: John Murray. *Illustrations.* 10*s.* 6*d. net.* 1913.) The chief interest of this book centres in the illustrations, for though the author, to judge by the foreword, had a serious object in view in his Holy Land tour, it cannot be said that his observations are of any permanent value. The illustrations, though unnecessarily hard and rather lacking in pictorial qualities, are well chosen to depict the chief points of interest in the Gospel story, and the author is careful to give, under the title of each subject, some Bible reference to the scene in question. Among the best pictures are perhaps those of the "Dead Sea," and "The Garden of Gethsemane."

'Big Game Shooting in India, Burma, and Somaliland.' By Colonel V. M. Stockley. (London: Horace Cox. 1913. Pp. xii., 282. *Diagrams.* 21*s. net.*) This is a useful contribution to big game literature. It embodies a considerable number of valuable hints and wrinkles, the fruit of the author's shooting experiences in India, Tibet, and Somaliland. Even the expert in *Shikar* need not disdain to consult this informative work, while travellers in out-of-the-way regions and explorers in general, even if not sportsmen, may glean some useful advice concerning matters of outfit and equipment. The author, for instance, gives a useful wrinkle about obtaining drinking-water from doubtful sources. If the water in the pool is foul, it is a good plan to dig a hole a few feet from the margin of the pool, as the water here, owing to natural filtration by percolation, will often be found drinkable, if not palatable.

'India and the Indians.' By Rev. E. F. Elwin. (London: John Murray. 1913. Pp. x., 352. *Illustrations.* 10*s.* 6*d. net.*) The author of this well-meaning, but somewhat scrappy, collection of essays on things Indian has attempted too large a canvas, and has handicapped himself by a too-comprehensive list of topics. The treatment of many of the subjects is, moreover, superficial as well as inadequate. Very skilful compression and a lucid style as well as a thorough grasp of the subject are required to make the discussion of such important topics as "Hindu Philosophy" and "Religious Phases"—to take two of the chapters at random—of any value within the compass of five and six pages respectively.

'Europe and the Far East, 1506–1912.' By Sir R. K. Douglas. Revised by J. H. Longford. (Cambridge: University Press. 1913. Pp. viii., 487. *Maps.* 7*s.* 6*d. net.*) The appearance of a new edition of 'Europe and the Far East' has followed closely on the death of its lamented author, Sir Robert K. Douglas. The work is revised and corrected, and brought up to date by means of an

additional chapter (1904–1912) by Mr. J. H. Longford, Professor of Japanese at King's College, London, and late British Consul and Judge of Consular Courts in Japan. As this useful and scholarly compendium was noticed in the *Journal* at the time of its original publication, it is enough to say that it well fulfils its object of giving a connected history up to latest times of the relations between the nations of the West and the Empires of China, Japan, Annam, and Siam.

AMERICA.

Brazil.

'Twentieth-Century Impressions of Brazil.' By Reginald Lloyd and others. London, etc.: Lloyd's Greater Britain Publishing Company. 1913. Pp. 1064. *Sketch-map and Illustrations.*

This portly volume endeavours to bring information concerning the great Southern Republic up-to-date, in an attractive and readable form.

Brazil has an area calculated at over 8,500,000 square kilometres. It is therefore larger than the area of the United States if we exclude Alaska. Any effort to combine under one cover the varied aspects of climate, geology, physiography, industrial development, the arts, sports, history, commerce, finance, and many other sub-headings, must necessarily, even if successful, give rise to some of the defects attending the qualities of such a compendium. The result of the effort is, on the whole, very praiseworthy, although we should have liked to see a few more maps in lieu of some of the commercial photographs inserted.

Early and contemporary history occupies, as is usual in this class of work, a considerable space, owing to the greater abundance of material at hand for this as compared with the scanty data which exist, in any reliable form, regarding the interior of the country. The hinterlands of Brazil have been traversed constantly ever since the early colonization of that country by the Portuguese, and, indeed, its great rivers have formed natural highways for the purpose. What is still lacking is information concerning the lands which lie back of the navigable waterways of the interior. The traders and explorers who have penetrated these regions have too often been content with an incomplete account of their travels, or left no written record at all. The present volume is therefore necessarily based mainly on official data, which must always be treated with a certain amount of reserve when dealing with the hinterlands. On the other hand, the statistics gathered with regard to exports, trade, commerce and development along the coast generally may be regarded as fairly up-to-date and reliable.

The publishers state frankly in the preface that the issue of a book of this class, both in English and Portuguese (the latter being of course the official language of Brazil), is impossible save at very considerable cost. While they have not asked Government for any subsidy on account of the restrictions which it might impose, this cost has been partly met by sale of copies at a high figure and partly by the revenue received for the insertion of commercial photographs, and, we may add, commercial paragraphs. This does not in any way prejudice the value of the information so given, which appears to have been well and conscientiously compiled. Readers, however, should be advised by this frank statement that the volume cannot pretend to be of an encyclopædic character, but aims rather at presenting the main outstanding features of the Republic, with special reference to definite enterprises established therein. We note in this connection, for instance, that while the bulk of the railways of Brazil are

mentioned, and information both useful and interesting concerning them is given, there are others, such as the Dourado, Itatibense, Funilense, Campineiro, Bananal, Rezende to Bocaina, Caxias-Cajazeiras, Marica, Rio do Ouro, Bragança, and Minas de S. Jeronymo, which do not appear.

The same remarks which apply to the inclusion of commercial photographs apply to some extent to the letterpress, that is, paragraphs on commercial undertakings occupy a space which, under other conditions of publication, would be considered excessive.

Having said so much, one can have nothing but respect for the industry and enterprise which has produced a commercial gazetteer, such as is, in effect, 'Twentieth-Century Impressions of Brazil.' It may be questioned whether the production of the book on heavy glazed paper, with massive binding, weighing altogether nearly 13 lbs., is advisable in a work which is meant to be used frequently for reference. The result, at all events, is a very handsome volume, finely printed and with clear and excellent photographs. The price of thirteen guineas places it beyond the reach of the person of ordinary means, who may be interested in learning about Brazil but not have ready access to a library or other public institution where this volume is kept. We would suggest to the publishers, at some later date, a handier and cheaper volume on the same lines. Meantime, the work as it stands, is of undoubted, if limited, value.

W. S. B.

HISTORICAL GEOGRAPHY.

Scythians and Greeks.

'Scythians and Greeks.' By Ellis H. Minns. Pp. xl. and 662. Cambridge: University Press. 1913. *Maps and Illustrations.*

This important book, on which we respectfully congratulate both author and publishers, meets much better than any other known to us in a West European language, what in hackneyed phrase is called a long-felt want. It goes very much farther and wider afield than Prof. Reinach's 'Antiquités du Bosphore Cimmerien,' and renders accessible a whole corpus of information previously hidden from most English readers in the obscurity of the Russian script and tongue. We say "meets," not "fills," and the author makes it clear in his preface that he would appreciate and approve the distinction. To fill the want in question a book is still needed with even greater wealth of illustrations than Mr. Minns has given us—perhaps better two books, one on the pre-Scythic and Scythic cultures, and one on the Greek culture of Southern Russia. If Mr. Minns, after a lapse of time, could bring himself to compile, at any rate, the first of these, making it as exhaustive as possible, and omitting no illustrations which are to be obtained (*e.g.* not omitting the Kelermes objects, and reproducing all parts of the Oxus treasure which have a Scythic element in them), he would lay archæologists under an eternal obligation. The other book would deal with what is so much more readily accessible elsewhere that he might well leave it to a future season, or even to another compiler. Considering Mr. Minns' exceptional qualifications, one cannot help wishing, indeed, that in the past also he had economized his time and the available space in the present volume by a more exhaustive treatment of the less accessible, *i.e.* the Scythian material, and a less exhaustive one of the more accessible Greek material. The special appendix on coins, he tells us, was an afterthought. To our thinking his first thoughts were best; not because this appendix is anything but most scholarly, accurate, and useful, but because its matter could all be found easily enough elsewhere.

Even the special articles on each of the Greek sites might have been left for a future reviser of Smith's 'Dictionary of Ancient Geography' to compile.

Let it be admitted, however, that this will not be everybody's view. Our own cannot help being coloured by a more frantic desire to learn about the Scyths than about the Greeks in Russia. The mystery which still surrounds the former renders them a most fascinating subject of inquiry from all sorts of view points, ethnological, archæological, geographical. How arose, whence radiated, what became of, this great Scythic culture, whose area extended from the borders of China to the Danube? Mr. Minns attacks all these questions with immense industry and exceptional knowledge. He follows the outliers of the culture down to the Oxus, across the Caucasus, and into Thrace. Deeply interesting is all the evidence he marshals of Iranian elements in the people and the cultures, and of Semitic Assyrian influence upon it. Possibly in a future treatise he will find he has to allow for more reciprocal influence than at present he suspects. Recent exploration in North Syria has been revealing, among antiquities of the later Hittite age, curiously frequent and striking Scythic features. When these are published, old views, now discredited, about a connection between Hittite and Scythic people may have to be revived, but with new-born discrimination of different ethnic elements which at one time or another shared the so-called Hittite culture.

This, however, is for the near future. At present all who are studying these West Asian problems of ancient ethnology, archæology, and geography will find Mr. Minns' book of invaluable service, and no serious library will be able to dispense with it. While the bulk of its matter is archæological, it not only has preliminary chapters devoted purely to geography, but it bears on geographical problems continually, particularly those of ancient continental communications. It includes, moreover, a number of ethnographic maps, obviously compiled by the author himself. Considerations of expense have no doubt led to his sketches being so reproduced that the maps have neither the contrast nor the clearness which a professional draughtsman would have imparted to them, and we venture to enter a mild protest against the use of ornate and fantastic lettering, of the type dear to the heart of young architectural students. But this is a small point, and if the choice lay necessarily between such maps and no maps at all, we can only be thankful we have what we have. Indeed, gratitude should be and is the last as well as the first note of a review of this most valuable volume.

D. G. H.

GENERAL.

David Livingstone.

'Livingstone and Newstead.' By A. Z. Fraser (Alice Spinner). *Portraits and Illustrations.* London: John Murray. 1913. 10*s.* 6*d. net.*

On his return from the Zambezi expedition David Livingstone stayed for seven months (September 1864 to April 1865) at Newstead Abbey as the guest of Mr. W. F. Webb, one of the big-game hunters whose acquaintance Livingstone had first made during the early days at Kolobeng. With Livingstone on this visit to Newstead was his daughter Agnes (Mrs. Livingstone Bruce). Between Livingstone and Mr. and Mrs. Webb—an Irish lady whose goodness and whose charm were equally manifest—there existed close ties of friendship and understanding. We are greatly indebted to Mrs. Fraser for this account of the relations between the explorer and her family. A daughter of Mr. Webb, the author was but a child when Livingstone paid his visit to Newstead, but she

retains a vivid recollection of those memorable months, and maintained a life-long friendship with Agnes Livingstone, who at the time of the visit to Newstead was a handsome and winsome young woman of seventeen. Mrs. Fraser's picture of the great explorer, seen in the intimacy of daily life and with the sharp eyes of a little girl, is full of interest; it helps us to get a more complete portrait of the noblest character in the illustrious roll of African explorers.

Mrs. Fraser's book is also a worthy tribute to her father. A man whose friendship was an honour to all on whom it was bestowed, he was endowed with those qualities which appealed directly to Livingstone—sincerity, simplicity, and strength of purpose joined to a keen interest in natural history and in geographical problems. Mrs. Webb's quick sympathy, her maternal care of Agnes (Mrs. Livingstone, it will be remembered, was then dead), the perfect ordering of her household, these things won the heart of the much-tried traveller, who found at Newstead that haven of peace of which he stood so much in need.

The record of the visit to Newstead is the pivot around which the story of this book moves, but it contains a good deal of other interesting matter. Much of the family history of the Livingstones is given (as also a genealogical tree). We are introduced to William Cotton Oswell, whose friendship for Livingstone was flawless; to Sir Roderick and Lady Murchison; to H. M. Stanley, who, sore at heart by his reception in England on his return from Ujiji, found in Mrs. Webb a friend and comforter; to Susi and Chuma, and that much less worthy servant of Livingstone's, Jacob Wainwright; to Mr. A. L. Bruce (Agnes Livingstone's husband), and to many other notable personages. Then, Newstead with its ghosts and Byron associations, is described, and a notable picture is drawn of the manner and life of a country family in the sixties and seventies of the last century. The book is of permanent value. The frontispiece is a portrait of Livingstone from the picture by J. B. Harrison at Newstead Abbey. It is a charming likeness, and gives the explorer a happier expression than any other portrait known.

F. R. C.

THE MONTHLY RECORD.

EUROPE.

Proposed Regulation of the Durance.—The Durance, much used for economic purposes in Provence, has a very irregular *régime*, due in part to deforestation, but still more to the impermeability of the greater part of its basin. At Mirabeau, the point where it debouches on to the plain, its discharge varies from 40 to 6000 cubic metres (1400 to 210,000 cubic feet). A vast project for the regulation of the river, as well as of its two affluents the Ubaye and the Verdon, has been studied by M. Wilhelm, an engineer in the service of the Department of *Ponts et Chaussées*. It would make possible the cultivation of the Crau, the irrigation of the Comtat, and would bring about a rise of 650 millions of kilowatts per hour in the available water-power. The probable cost would be 500 million francs or 20 million pounds. The central idea in the scheme is the creation of reservoirs held up by barrages, it being held that the measures already tried in the direction of re-forestation are too slow and costly a means of gaining the desired end. The only objection to the plan of reservoirs is the risk of their becoming silted up, seeing that the

Durance carries down yearly past Serre-Ponçon 2,600,000 cubic metres of mud and 200,000 of gravel. The sites suggested for the barrages are at Serre-Ponçon, a little below the confluence of the Ubaye; Chapelue on the Guil; Pont du Castellet and Lac de Paroird on the Ubaye; Gréoulx; Carréjuan and Lac d'Allos on the Verdon; and La Martre on the Artuby. The most important would be that of Serre-Ponçon, with a total height of 130 metres (416 feet) and an impounding basin stretching back 15 kilometres.

Evaporation from Swiss Lakes.—The *Meteorologische Zeitschrift* for May, 1913, has an article on this subject by J. Maurer. The two lakes under observation, during 1912, were those of Zug and Egeri, the former being 1200 feet above sea-level, the latter 2200 feet. The method of observation was the hydrometric one, and the calculations based upon it, taking into account the various factors in the problem such as rainfall and the regulation of the lakes by sluice-gates, show that on the lake of Zug the highest monthly evaporation from December 1911 to November 1912, both inclusive, occurred in July, when it amounted to 5·1 inches (130 mm.), and the lowest in December and November, with 1·3 inches (35 mm.), the total value for the year being 30·5 inches (775 mm.). For the higher lake the figures range from a maximum of 4·1 inches (105 mm.) in July to 0·9 inch (25 mm.) in December, the twelve-monthly total being 29·1 inches (740 mm.). The smaller evaporation from the upper basin is due partly to the greater duration and intensity of rainfall which curtails the time during which evaporation is in active progress, and partly to the lower temperature of both air and water. The yearly total for the two lakes is rather high for a year with a cool, wet summer like 1912, and the author considers that in 1911, with its hot, dry summer and autumn, it must have approximated to 35 inches (900 mm.). An extension of this type of observation is greatly needed, as the literature of the subject of evaporation in nature is very poor in comparison with that on rainfall. A somewhat remarkable feature is the high surface temperature of both lakes in the winter of 1911-12.

ASIA.

The Dead Sea Level.—The records kept since 1900 by Dr. E. W. G. Masterman and his colleagues, of the fluctuations of the level of the Dead sea, have more than once been referred to in the *Journal* on the basis of notes printed from time to time in the *Quarterly Statement* of the Palestine Exploration Fund. The general results of the observations, which are complete from 1900 to the present time, with the one exception of the year 1909, are presented in a useful form in the *Quarterly Statement* for October, 1913, the fluctuations being shown graphically by means of a chart in which the total rainfall recorded in Jerusalem for the several years is also stated. The curve shows that while a general fall, both of the low and high-water levels, took place from 1900 to 1904, a steady rise has since made itself felt, though its rate has been checked since 1911. A general correlation between the fluctuations and the rainfall is naturally to be traced. Thus, whereas between 1900 and 1904 three seasons showed a rainfall of from 16 to 21 inches, the marked rise of level in 1906 followed one of 38·94 inches, and the rise in 1908 and 1911 also followed seasons with precipitation considerably above the mean. Other factors, however, come into play, as, *e.g.*, the late or early melting of the snow upon Hermon. In a cold spring the melting is retarded, and the amount of water poured into the Dead Sea *late in the season* is greater than otherwise. The height of the summer temperature, and the prevalence or otherwise of dry desert (south-east) winds, must also have an important effect. Dr. Masterman quotes evidence for a considerable rise in

the level of the sea during the nineteenth century, the accounts of travellers showing that roads, etc., now flooded were formerly above the level of the water. Dead trees are now to be seen rising from some feet of water.

The Bailey-Morshead Expedition to the Tsang-po.—Some details of the experiences of this expedition (see December number, p. 571) are given in the Calcutta *Englishman* of November 20, 1913. The two officers are said to have traced the course of the Tsaug-po up to the position in which the supposed falls were placed by Kinthup, and for 150 miles beyond, finding merely a succession of rapids such as occur on any river which breaks through a mountain chain. At one spot the drop is said to be something like 30 feet in 50 yards, and, the width being only 50 feet, the velocity is enormous, the appearance being that of a river rushing over a weir. The total distance traversed is said to have been 1700 miles, the travellers finally emerging at Dewangiri in Assam, after a journey of thirteen months from the first start in the Mishmi country. The march naturally involved great dangers and fatigues, and the travellers were put to it for want of money, the coolie entrusted with the purse having absconded at an early stage. They met with much kindness and hospitality from the Tibetans, the only difficulties with them arising from their being mistaken for Chinese.

Mr. Tachibana's Second Expedition to Central Asia.—This traveller, whose plans before starting on his second expedition for archæological research in Central Asia were outlined in the *Journal*, vol. 35, p. 448, sends us a brief narrative of the completed expedition, accompanied by a map, on which the route followed is clearly shown. Reaching Urumtsi in November, 1910, by way of Semipalatinsk, Mr. Tachibana proceeded to Turfan, an important place for the history of the old Buddhist civilization, the investigation of which was the object of his journey. Though formerly under the influence both of China and India, the archæological finds, no less than documentary evidence, show that the former played the greater part in its history. In T'ang times it was a political centre of Chinese rule in this part of Asia, the country being known as Kao-Shiang. At Kara-Khoja the traveller found many Buddhist texts (mostly Mahayana sutras) as well as an intact mummy. Another ruined site of great interest is Yar-khoto, or Chiao-ho according to the old Chinese designation, in Han times the chief fortress of the state of Cha-tsi Shan-Wang-T'ing. Leaving at Turfan his English assistant Hobbs, with directions to meet him later at Kucha, Mr. Tachibana went south across the Kuruk Tagh to the Lop Nor desert, in order to investigate the ruined site of Lo-lan, certainly one of the fortresses of the state of that name, whatever the verdict as to its being the main centre, as maintained by Sven Hedin. Springs, too salt to be drinkable, were found among the hills, and at the southern foot of the latter many wild camels were seen. After loading up at Altimush Bulak with blocks of ice for drinking, the caravan started across the endless succession of sand-dunes, which, owing to the prevailing wind, sloped gradually on the north-east side, but precipitously on the south-west. Their monotony was only varied by occasional clayey depressions and dead trees. On New Year's Day, 1911, the footprints of an animal were seen, and frozen salt-marshes were reached. Here a group of Lop hunters were met with, among them being a man whom the traveller had accompanied on his previous journey. He presented some frozen fish, and said that the place was called Yakazuma. Passing Abdal, on the Tarim, the party reached an old castle on the northern foot of the Altyn Tagh, where many relics of ancient Buddhism were found, though nothing is said by Hiuen Thsang of Buddhist influence in this district. On the castle wall was a picture of

Kshatriya with an elephant, and a manuscript was found written (on bark) in a language akin to Sanskrit. Buddhism must therefore have been introduced direct from India. A number of jade stones were also found. From Chaklik the traveller went due west, leaving the usual track along the Cherchen river, and crossing the big dunes, 300 feet in height, which no previous traveller had tried to climb. Completing his outfit at Cherchen, he began (February 4) the most adventurous part of the whole journey, making for Kucha by an entirely new route across the Takla Makan desert. This was done in order to save time, as the desert route could not be of interest archæologically, but as it had been an old wish on the part of Mr. Tachibana to cross the desert by this route, it was a satisfaction to be able to carry it out. The dunes proved to be over 300 feet high—much higher than those of the Lop-nor desert, and the view across their ocean-like expanse was really grand, especially at sunset. After ten days the supply of ice had run low, but on the 20th the bank of a dried-up river was reached, and followed some 20 miles westward. It would seem to be the lower course of the old bed of the Tarim, placed by Sven Hedin south of Kucha. On the 23rd a well was dug in a damp spot, but the water was undrinkable. However, three days later the party happily reached Kakto, a small village on a southern branch of the Tarim, peopled by immigrants from Lop. Pressing on to Kucha to meet Hobbs, the traveller learnt to his sorrow that he had died from illness and that the coffin bearing the body had been sent to Kashgar, whither Mr. Tachibana proceeded with all speed, and was in time to be present at the funeral. He afterwards visited Khotan, continuing his archæological researches, and from Keriya made several persevering attempts to penetrate the Tibetan plateau by way of Polu, but the difficulty of the country and constant fatalities among his animals obliged him to desist. He then followed the northern foot of the Tian Shan, by Cherchen and Chaklik, to Tun Huang in Kansu—in old days an important place strategically as commanding the highway from China to the west. Here he visited the "Cave of the Thousand Buddhas," and secured some of the sutras not removed by Sir Aurel Stein and Dr. Pelliot. Owing to the revolution in China, he returned home by way of Turfan, Urumtsi, and Siberia.

Railways in the Caucasus.—A correspondent sends us some details of the line now under construction by a private company from Armavir to the Black sea coast. The latter is reached at Tuapse, the route being *viâ* Kurgannaya, Dondukovskaya, Giaginskaya, and Belorschinskaya, with a branch from the latter station to Maikop. The total length of the main line is 151 miles, the branch being 15 miles long, and it is hoped that the line will be completed in the spring of 1914. Meanwhile, work on the new harbour at Tuapse is actively proceeding, and it is anticipated that this will be finished in 1915. To facilitate trade before that date, however, the first concrete jetty will be constructed at once, and on its completion the export of grain will be possible; meanwhile, the old harbour, which has wharfage for three vessels at a time up to 24 feet draught, is being carefully conserved. Tuapse will, it is hoped, become a relief port to Novorossisk for the heavy export trade in grain from the Caucasus, and for the large shipments of agricultural and other machinery, etc., imported.

AFRICA.

A Lady's Journey across Africa.—Writing on October 28 last, Miss Gertrude E. Benham announced her arrival at Chinde four days earlier, after completing an interesting journey diagonally across the continent from Nigeria. The greater part was done on foot with quite a modest outfit, and

living mainly on the produce of the country; but in parts Miss Benham made use of water (and for a short distance railway) transport, thus adding considerably to the expense, which even so amounted to only £170, including the outfit and stores bought in London. The total time occupied was thirteen months. From Kano she went by Bauchi and Yola first into German and then into French territory, making her way (partly by river) to Stanleyville, and striking thence east to Uganda. Then, turning south through German East Africa, she visited Kivu and the Kirunga volcanoes, climbing Niragongo and the new cone formed by an eruption in December, 1912. The rest of the journey was made down lakes Tanganyika and Nyasa and by Blantyre to Chinde.

A Hitherto Unknown Tribe in German East Africa.—Mr. E. F. Kirschstein, whose journey of research in the region of Lake Nyasa has already been referred to in the *Journal* (vol. **38**, p. 204; **41**, p. 284), is said to have come upon the remnant of a hitherto unknown primitive tribe in the plain between the Tanganyika plateau and the tableland of Unyika. These people call themselves Wasimwanza, and occur in greatest purity near the village of Chindi, a little north of the frontier of North-East Rhodesia. Formerly a purely hunting people, they have learnt agriculture from the Wanyamwanga, with whom they have now almost completely mingled, taking from them their language and the mode of building their huts.

Tidal Phenomena in South African Wells.—An interesting and important paper by Mr. Andrew Young, M.A., entitled "Tidal Phenomena at Inland Boreholes near Cradock," is published in vol. **3**, part i., 1913, of the *Transactions of the Royal Society of South Africa*. In it are described in detail observations begun in 1905 and carried on at intervals until the present year on a farm at Tarka Bridge, Cradock district. The wells are 2700 feet above sea-level, over 100 miles from the coast, and, though the deepest is only 225 feet, they obviously connect with deep fissures, since the waters issue at 80° Fahr., accompanied by large quantities of the inflammable gas methane, and contain also sulphuretted hydrogen gas in solution. The remarkable phenomenon is that measurements of the pressure at which the water issues show a fluctuation in some respects analogous to the tidal fluctuations of the sea. Direct measurements covering several days established the fact that there was a fluctuation both in the amount of water discharged and in the well pressure. The precise nature of the fluctuations was then studied in continuous records obtained by means of a clock-driven, self-recording apparatus. The longest continuous record extending over a period of fifteen weeks showed that the semi-diurnal fluctuations attain a maximum amplitude at fortnightly intervals corresponding to the times of new and full moon; and further revealed the fact that the mean daily water-pressure rises with each fall of atmospheric pressure, and conversely, as recorded concurrently at the farm by barograph. The graphic records from these wells were subsequently compared with tide-gauge records from the South African ports of Cape Town, Port Elizabeth, East London, and Durban, with the result that a general resemblance was discovered, though the well tides at Tarka Bridge lag some fifteen hours behind the sea-tides of East London. The well curve was further subjected to a process of harmonic analysis according to the late Prof. Chrystal's method of "residuation," for the purpose of determining its principal harmonic components, and comparing them wfth the well-known harmonic components of marine tides. So much for the facts, which seem to establish beyond doubt that the fluctuations are directly or indirectly due to extra-terrestrial causes. A satisfactory explanation of the connection can, however, only be arrived at by the co-operative discussion of astronomers, geo-

logists, and hydraulicians, but the principal conceivable theories would appear to group themselves into three classes: (1) that the underground water exhibits the gravitational influence of sun and moon; (2) that the marine tides act on the coast, loading and distorting the land; (3) that the marine tides act in periodically reducing the freedom of outflow of underground water through submarine springs. Anyhow, the case is a most interesting one, especially as there is not supposed to be any other instance in the world of an inland well showing variations of true lunar periodicity. The farm in which the wells are situated was formerly called "Driefontein," but is now known as "Tarka Bridge." It lies 15 miles south-east of the town of Cradock, and on it occurs the junction of the Tarka and Fish rivers. It is mostly composed of arable land between 2700 and 2800 feet above the sea, but on the east the land probably exceeds 4000 feet in height. Geologically the farm is formed of a series of shales and sandstones with a few intrusive dykes of dolerite.

AMERICA.

Ascent of Mt. Denali (Mackinley) by Archdeacon Stuck and Mr. H. P. Karstens.—The ascent of this mountain by Prof. Parker and Mr. Belmore Browne, to within a few hundred feet of the actual culmination, was described in the *Journal*, vol. **42**, p. 197. The first *complete* ascent was achieved in 1913 by Dr. Hudson Stuck, Archdeacon of the Yukon, with the co-operation of Mr. H. P. Karstens, without which last, the Archdeacon frankly allows, the enterprise would not have been undertaken, though as a keen climber he had cherished the desire to ascend the great mountain since his first arrival in the country nine years before. A graphic account of the ascent is given by Dr. Stuck in *Scribner's Magazine* for November, 1913. The success of the attempt seems to have been largely due to the foresight exercised in sending up the outfit by river from the interior during the previous autumn. In this way the supplies were pushed forward from Fairbanks by way of the Kantishna river and its tributary, the Bearpaw, to a point about 50 miles from the base of the mountain, the travellers starting on their actual expedition in the following March. At a base camp at 4000 feet a fresh supply of pemmican was made of the choicest parts of caribou killed for the purpose, and the suitability of this food seems also to have helped to success. The route followed was that opened up by the miners McGonogall and Anderson in 1910 (*Journal*, vol. **36**, p. 104), which had also been adopted by Prof. Parker, and it is one of the results of Dr. Stuck's expedition to substantiate the claim of the 1910 party to have ascended the mountain, though the summit reached by them was not the highest peak of all, but the secondary summit to the north. By the aid of their glasses the Archdeacon and his companions were able actually to see the flag-staff set up by the miners. On reaching the head of the great Muldrow glacier (11,500 feet), which with its two forks drains the whole northern face of the mountain, it was found that the whole aspect of the north-eastern ridge, which separates the two branches of the glacier, and offers the only means of ascent to the great snow basin above, had changed since Prof. Parker's ascent. What he had described as "a steep but practicable snow ridge," was now a confused jagged mass of rocks and ice; the transformation being evidently the work of the severe earthquake experienced by the earlier climbers on their return from the mountain. The difficulty of the ascent was thereby enormously increased, a way having laboriously to be made over or around each individual block, while, in the absence of any space on which to pitch a tent, it was necessary to return each night to the glacier camp. Bad weather, too, caused much delay, but when

the ridge was once vanquished a brilliant day favoured the final ascent, though the party suffered much from cold and the difficulty of breathing. A mercurial barometer (besides aneroids and boiling-point thermometer) was carried to the summit, and gave a reading of 13·6 inches. In the complete absence of clouds the view was magnificent, though the cold forbade a long stay. Archdeacon Stuck pleads for the retention of the native name Denali for the great mountain, and says that "to have the incomparable view of these mountains from Lake Minchumina,* as he did in 1911, is to recognize at once the simple appropriateness of the native names. There, side by side, they rise, Denali, 'The great one,' the master peak; Denali's wife, the lesser but still enormous mass." His descriptions, especially of the stupendous ice-fall of 4000 feet from the upper basin to the glacier below, are particularly realistic.

Forestry in the United States.—In reference to our note on Forestry in New York State in the *Journal* for September last (p. 298), Dr. H. P. Baker, Dean of the State College of Forestry at Syracuse University, writes to point out that the degree of Master of Forestry, on which comment was made in the note, is given by Yale University only after two years of very thorough work following the degree of A.B. or B.S. granted either by Yale College or some other body of equal standing. We regret that our note should have given the impression that a comparison was drawn between America and English practice to the disparagement of the former. This, we believe, was not in the least intended by the writer of the note, the idea being merely that the subject was a somewhat more specialized one than the majority of those for which degrees are given in this country. We have no doubt that the standard for the M.F. degree is of the high character claimed for it by Dr. Baker.

Chilean Hydrographical Surveys.—For the past twenty years much activity has been shown by the Chilean Marine in the survey of the intricate channels and passages which characterize the coast of western Patagonia. Many of the results have been recorded from time to time in the 'Anuario Hidrografico de la Marine de Chile,' but some are yet unpublished. In view of the scattered nature of the records, Dr. H. Steffen—himself well known for his investigations on this coast—has done a service to geographers by gathering up the main results of all this activity in a paper printed in the *Zeitschrift* of the Berlin Geographical Society, 1913, No. 6. Taking the various sections of the coast from north to south, Dr. Steffen sketches the progress of the work in each, and outlines the contributions made to a knowledge of the hydrography and general geography. Among the officers most active in carrying out the work is Captain R. Maldonado, who from 1892 onwards surveyed the coasts of Chiloe island, as well as of the opposite mainland, and within recent years has directed important operations further south. A general survey of the whole inner waters from Puerto Montt to the Guaiteca islands has been carried out within the past few years by Captain J. Huerta, while the Guaiteca group itself was newly surveyed in 1903-04 by Captain G. G. Huidobro. This work has lately been extended by soundings carried out by Captain Dublé, which have shown that the continental shelf—on which the Guaitecas and Chonos groups, with other islands, are situated—makes a considerable outward bend in about 45° S., so as to include Huamblin island as an outpost. Further south, the 100-fathom line, which may be taken to mark the limit of the platform, runs quite close to the mainland at Cape Tres Montes. From 1904 onwards the

* This view from the west is said to be the only one giving an adequate idea of the mountain. On this side it falls into "a sheer gulf many thousands of feet deep."

detailed examination of the Taytao peninsula was taken in hand by Captains Huidobro and Pacheco, and it was proved once for all that no channel runs through this mass of land from north to south. The question of the possible opening of water-communication across the narrow isthmus of Ofqui, by which the peninsula is joined to the mainland, was also studied by marine engineer De Wits. After Dr. Steffen's own preliminary examination (1898–99) of the region of Baker fjord had revealed the importance of this as a means of access to one of the most promising regions of south-west Patagonia, its thorough survey was taken in hand by Captain Nef. Similar work has been done since 1909 for the coastal region south of 48° by Maldonado and others, one of the results being the demonstration that the Campaña island of the map is really split up by channels into half a dozen large and numberless small units. The breadth of the continental platform in this section was also determined by soundings, and climatological data were collected. Fishing and sealing are likely to be the only important resources of the islands examined. Further work has been done in the region of Ultima Esperanza inlet and of Otway and Skyring waters, various new channels having been discovered. It was found that, apart from a neck of land 400 metres across, over which the natives draw their canoes, water-communication exists from Magellan strait by Skyring water to Obstruction channel and so to Ultima Esperanza. (Further light on this region was thrown by the work of the Swedes Skottsberg and Quensel described in this *Journal* in 1908.) Good work has been done in the region of Queen Adelaide archipelago and Smyth channel, and studies of the natives have been made. Doubt has been raised as to the relationship of the "Canoe" Indians with the Akalaluef of Tierra del Fuego, and it has been proved that they are not pure nomads, each family returning from its hunting trips to its own station.

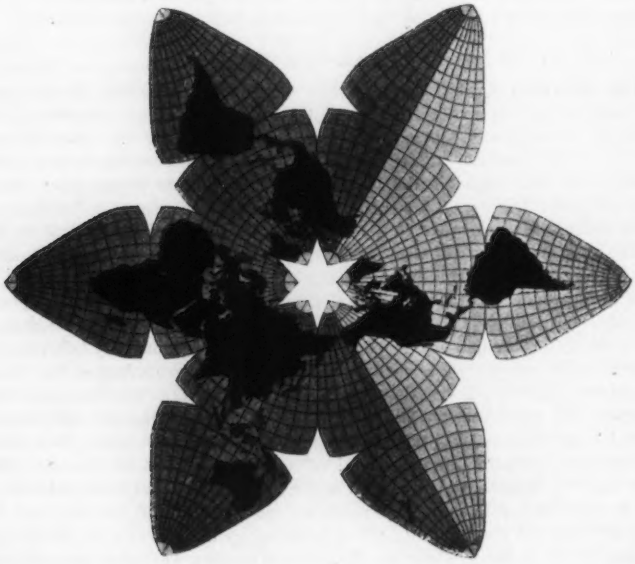
POLAR REGIONS.

The Canadian Arctic Expedition.—After several months' silence, news was received in December from Mr. Stefánsson, giving an account of the course of his expedition down to October 30, at which date the despatch was sent from Point Barrow, Alaska. He reports that the ice conditions have been most unusual this season in the Beaufort sea, and that of eight vessels which came to Point Barrow last summer only one had been able to escape and return south. His own principal vessel—the *Karluk*—had gone adrift in the moving ice-pack during his temporary absence on shore, and had not since been seen. This will necessarily involve a certain set-back to his plans, though, as the ship is provisioned for three years and is in charge of the experienced ice-navigator, Captain R. A. Bartlett, there should be no real reason to despair of the safety of the party on board. The *Karluk* was heavily beset in the thickening ice, and drifted northward past Point Barrow on August 8. Twice she got free, but drifted with the wind in a direction parallel with the coast until September 10, being then in 70° 47′ N., 150° 7′ W. Believing that the ship was frozen for the winter, Mr. Stefánsson landed with Messrs. Jenness, McConnell, Wilkins, and Cook, for the purpose of obtaining fresh meat by hunting. The party had two sledges, and were well supplied with guns and ammunition. A violent north-east gale sprang up, accompanied by snow and ice, and had the unusual effect (for the time of year) of breaking up the ice. In the thick fog it was impossible to see whether the *Karluk* was carried westward with the ice, or was set free and so enabled to reach the mouth of the Mackenzie. If remaining imprisoned, previous experience shows that the ship would probably be carried back again in time; but even if caught in the Polar drift, Mr.

Stefánsson thinks that with care the supplies might be eked out for four years. He and his companions went by land to Point Barrow to look for the ship, but she had not been sighted, though Eskimos were met with later who reported having seen a schooner (probably one of the vessels known to have been beset and abandoned), about 10 miles out from the point. Mr. Stefánsson was about to start for Collinson point *en route* for Herschel island, and would leave Mr. Jenness for ethnological research with the Eskimos at Harrison bay. His plans will have to be modified somewhat owing to the separation from the ship, but he hopes that the carrying out of the original programme may only be delayed. In February and March he hopes to make a sledge expedition northward over the ice on the 145th meridian, and may possibly push on to Banks island or Prince Patrick island in advance of the ship. He speaks of his small auxiliary vessels—the *Alabama* and *Mary Sachs*—as in safe winter quarters at Collinson point, but according to a report from the captain of the latter, received at Nome, Alaska, on November 28, this vessel had since been crushed by the ice, and all the provisions and scientific instruments lost. Those on board the *Karluk* number twenty-five, including (besides her captain) Messrs. Beuchat, Bjarme Mamen, Forbes-Mackay, Mallock, McKinley, and James Murray. Further news will be awaited with anxiety.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

A New Projection.—Mr. B. J. S. Cahill, of San Francisco, sends us a paper read before the Technical Society of the Pacific Coast on October 11,



ONE ARRANGEMENT OF MR. CAHILL'S PROJECTION. (*NOTE.*—THE DARK TONE SHOWS THE WORLD COMPLETE, THE LIGHT PORTION INDICATING THE REPEATED PORTIONS.)

1912, entitled "A Land Map of the World on a new Projection." He divides the sphere into octants; projects each octant on the so-called "secant conical" projection, without specifying which parallels are taken as standard; curves the meridians inwards in the northern and southern parts of each octant; and flattens the equatorial boundaries. The author gives no theory or numbers to explain how he has contrived these seemingly arbitrary distortions. His "mechanical demonstration of the great accuracy of this projection" is effected by cutting up oranges and a rubber ball about 2 inches in diameter. The value of his claim that "practically all the important shipping lines of the world will show on the map in absolute integrity from port to port" may be judged by a glance at the route round the Cape to Australia, as represented on his map. Mr. Cahill's map is an attractive little diagram of the world, ingeniously arranged so that the more violent distortions of meridians mostly fall at sea. For a scale larger than one in five hundred million the difficulty of defining the particular method of construction would be more conspicuous. The claims that it should "constitute San Francisco's contribution" to the International Map; that the projection is "more accurate than any yet attempted"; or that the map is "identical with the surface of a globe, laid out literally on a plane," have no serious value.

Dust-falls in the Atlantic and the North-East Trades.—It is well known that the portion of the Atlantic between the Canaries and Cape Verdes is particularly subject to dust-falls and atmospheric haze, a fact which may account for its being named by the Arab geographer Edrisi the "Sea of Darkness." Much discussion has taken place on the origin of the dust, for while most geographers naturally placed the source region in the African deserts, Ehrenberg disputed this on the score of the organisms contained, maintaining that red-coloured dust (as that in question generally is) could not originate in North Africa, and that the north-east trades, by which the dust would be carried, if it came from North Africa, had no existence. While the African origin has been generally taken as proved within recent years, Dr. G. Hellmann has lately shown (*Sitzb. K. Preus. Akad. der Wissenschaften*, 1913, No. xiv.–xv.) that the results of recent observations in the Sahara entirely refute Ehrenberg's objections. Records of wind-frequency, though still far from abundant, are now forthcoming for certain stations on the Western Sahara and its coast, as well as from the desert south of Algeria. At the French Mauretanian station of Fort Coppolani two years' observations show that north and north-east winds—just those required to bring the dust from Africa—predominate throughout the year. On the actual coast we might expect the direction to be modified by local influences, but north and north-east winds are still the most frequent, though north-west winds also occur. In the Algerian Sahara the winds blow almost exclusively from the north-east. Dr. Hellmann concludes that the north-east trade does blow in the Western Sahara, between 18° and 28° N., during the cold season, while taking a prominent place (either as a north or north-east wind) for the rest of the year. Again, the work of French explorers and geologists has shown that red and reddish-brown sands and dust are commonly met with in the desert, especially the central parts, as well as yellow and whitish deposits. That a reddish colour prevails in the dust-falls over the part of the Atlantic in question would seem to be due to the fine impalpable nature of the reddish deposits, which permit the red dust to be carried for greater distances than that of other colours. This is borne out by the facts observed during the great dust-fall of 1901 over North Africa, Southern and Central Europe, discussed at the time by Hellmann and Meinardus (cf. *Journal*, vol. **20**, p. 107). Dust-falls and

dust-haze occur also in the regions south of the Sahara, though the provenance of the dust has here too been subject of debate (cf. *Journal*, vol. 42, p. 297). Dr. Hellmann considers that the new facts as to the trade-wind in the Western Sahara necessitate some modification of Schirmer's conclusions on the subject in his well-known work.

GENERAL.

Exhibition of the Collections of Captain Scott's Antarctic Exploration.—On Tuesday, November 25, 1913, a selection of the specimens collected on the British Antarctic (*Terra Nova*) Expedition, 1910, was placed on exhibition in the Central Hall of the British Museum (Natural History). The specimens displayed comprise marine animals obtained in the Antarctic seas, off New Zealand, and off the east coast of South America; representatives of Antarctic diatoms, algæ, lichens and mosses; a selection of the Antarctic birds and seals collected; specimens of the large hexactinallid sponges of the Antarctic seas; samples of the fossil plants collected in New Zealand, pieces of fossil wood and fish remains from Victoria Land, specimens of lava and crystals of felspar from Mount Erebus, some of the rock specimens from the Beardmore glacier collected by the South-Pole party, a map of the route of the South-Pole party, and twenty photographs taken on the expedition. The specimens will probably remain on exhibition for about two months.

A Memorial to Lieut. Boyd and Captain Claud Alexander was unveiled in the parish church of Cranbrook, Kent, on November 21, 1913, the ceremony being performed by Lady Scott, widow of Captain Scott, who is a personal friend of the Alexander family. The memorial—consisting of a central figure representing Africa, with medallion portraits of the brothers on the two sides—was dedicated by the Archbishop of Canterbury, who gave an address in which the work of the brothers, as also of the lost explorers in the southern ice-wastes, was spoken of with just appreciation. The memorial is the work of Prof. Robert Colton. It will be remembered that Cranbrook was the home of the brothers, who were the sons of Colonel Alexander of that place.

The Nineteenth Congress of Americanists will meet this year in America in two sections, the first at Washington, the second at La Paz, Bolivia. The first session will take place October 5–10, 1914, under the auspices of the Smithsonian Institution, with the co-operation of other learned bodies. During the meeting an excursion will be made in the neighbourhood of Washington, and two more extended excursions will be organized afterwards, the one to the ancient mounds of Ohio, the other to New Mexico. The secretary is Prof. A. Hrdlička, to whom titles of papers to be presented should be sent as soon as possible.

OBITUARY.

Alfred Russel Wallace, O.M.

By the death of Alfred Russel Wallace, on November 7 last, at the age of ninety years, the Royal Geographical Society, to which he was elected in 1854, loses one of its oldest and most distinguished Fellows; and Natural Science, especially in its biogeographical aspect, one of those who have, in most widely extending its boundaries and deeply influencing the thought of his time, achieved a name which will live as long as Natural Knowledge is cultivated. With Wallace there passes almost the last

of the great field naturalist travellers who, with eyes open for all the "ologies," were "searchers after truth, and interpreters of nature." His name must be listed in the illustrious company of Humboldt, Belt, Bates, Tristram, Hooker, and Darwin, to indite only those names that rise unbidden to the mind.

A. R. Wallace was born at Usk, in Monmouthshire, in January, 1823. He obtained his early education at Hertford Grammar School, and thereafter assisted, for a short time, an elder brother in land-surveying in various parts of rural England. During these excursions he was brought into direct contact with country life whereby his inborn love of Nature was greatly stimulated, and he began to collect and study insects and plants. At the age of twenty-one he became English master in a college in Leicester, where he nursed his growing tastes by observation in the open and by reading books of travel, till dominated by an irresistible passion to see with his own eyes "all those wonders which I delighted to read of in the narratives of travellers." In Leicester he encountered Henry Walter Bates, a keen entomologist, and a man with like dominating aspirations and enthusiasms to his own, with whom he formed a warm friendship, and kept up a correspondence after he left Leicester. This happy association formed the starting-point of the remarkable careers of both men, and in due time of the evolution of two illustrious names in biological science.

In 1848 the two friends set sail together for Para to study the natural history of the Amazonian region. After a couple of years' association they chose different spheres of exploration. Wallace proceeded to investigate the great northern tributary of the Amazon, the Rio Negro, finally penetrating along the Rio dos Uaupés, the largest branch of the latter previously unvisited by a scientific investigator. In this journey he encountered endless annoyances, difficulties, and dangers, but surmounted them all with the unexampled patience, perseverance, and good temper which were notable characteristics of the man. During his four assiduous years in this region he not only accumulated large botanical and zoological collections, but a vast store of facts and observations, and, what was of still greater value, a rich asset of experience, which began shortly to bear unexpected fruit. On his way home in 1852, Wallace suffered the heart-breaking misfortune, "which every traveller and naturalist," to use his own words, "will fully appreciate," of losing the bulk of his journals and the entire collections he was bringing with him, by the burning, in mid-ocean, of the vessel in which he was a passenger. Those on board escaped in a leaky boat in which, for ten days before their rescue by a passing ship, they suffered much from exposure and from the daily dread of foundering. The results of this expedition, which, but for his shipwreck, would have been more important, are recorded first in a paper to this Society in June, 1853, and in his 'Narrative of Travels in the Amazon and Rio Negro,' published just one year after he had set foot in England. Throughout his travels, Wallace paid special attention to the physical geography and geology of the regions he traversed in relation to their fauna, flora, and inhabitants, and, but for the loss of his notes and sketches, he had intended to devote his book to the 'Physical History of the Amazon.'

The pleasures he found in the "contemplation of the strange and beautiful objects continually met with, and the deep interest arising from the study of the varied races of mankind," determined him to continue the pursuit he had entered upon, and to re-visit the tropics. Accordingly, we find that, before the middle of 1854, Wallace had already arrived in Singapore, the threshold of that Eastern Archipelago with which his name was destined to be very closely identified. One of the objects of his visit to the Amazon was the hope of finding some solution to the origin of species—a question he seems to have constantly pondered and puzzled over in his new sphere of exploration. The problems of specific and individual variation—the great differences in the midst of much likeness existing between

the inhabitants of neighbouring land masses—now provided him with much food for meditation; as also the close relation between preceding geological changes and the amount of difference existing between animals of adjacent districts. He became deeply impressed with "the importance of a minute knowledge of the different groups and their geographical distribution to the mapping out of the islands and continents of a former epoch." This is evident from his paper "On the Law that has regulated the Introduction of New Species," which he contributed to the *Annals and Magazine of Natural History* in 1855. It was not till 1858, however, when lying under an attack of malarial fever, with his body prostrate but (as so frequently occurs during the height of this fever) his brain exhilarated, active, clear, and released from the inhibition that mazes the thing thought upon "with thinking of it," that in an illuminating flash the solution of this question revealed itself clearly to his mind, in the idea of "the survival of the fittest" as an application of the facts set out in an Essay on Population, by Malthus, which had greatly impressed him. The moment the abatement of his fever permitted, Wallace rose from his bed, committed to paper his now famous essay, "On the Tendency of Varieties to depart indefinitely from the Original Type," and posted it off to Darwin, with whom he had been in correspondence over cognate subjects, which, however, had "led him to conclude that the latter had arrived at no definite view as to the origin of species." As is well known, this communication fairly staggered its recipient, for "the key to this mystery" had suggested itself to Darwin many years before—as was known only to his intimate friends—furnished by the accidental perusal of the same famous Essay of Malthus, which had, strangely enough, led Wallace to the same idea. "Wallace," writes Darwin, "has arrived at almost exactly the same general conclusions as I have on the origin of species;" if he "had my manuscript sketch written out in 1842 he could not have made a better short abstract." It was with great difficulty that Darwin would allow his scruples to be overcome about "honourably publishing" his sketch now that "Wallace has sent me an outline of his doctrine." "I cannot tell whether to publish now would not be base and paltry." In his magnanimity Darwin was all for sending Wallace's paper to be published without any reference to his own earlier discovery and to the greater mass of evidence he had accumulated in its support. The *Darwinian Theory* was thus nearly coming to be designated the *Wallacean Theory;* but, as is well known, through the influence of Hooker and Lyell, Wallace's essay and Darwin's preliminary abstract were simultaneously communicated to the Linnean Society at its memorable meeting on July 1, 1858— both naturalists appearing as equally great and independent discoverers of the Origin of Species. The unselfishness of both authors in the matter—Darwin acknowledging Wallace's priority; Wallace always conceding pride of place to Darwin as the prime discoverer and elaborator of the theory—and their unbroken life-long friendship are matters of history, too delightful and uncommon among even "friendly rivals" to be ever allowed to be forgotten to the two men.

In 1859, while still in the East, Wallace contributed to the *Journal* of this Society an account of his visits to New Guinea and its neighbouring islands; and in 1860 to the Linnean Society a further paper on the subject, so full of attraction for him, of "The Zoological Geography of the Malay Archipelago." In 1862 he finally returned home, and for six years devoted himself to the study and arrangement of the enormous materials he had collected, and to contributing to numerous societies and journals instructive papers containing new facts or fresh expositions or amplifications of the propositions in his theory of the origin of species. In 1863, there was printed in our *Journal* his very important paper on the "Physical Geography of the Malay Archipelago," illustrated by a map on which for the first time the islands

are divided into two regions by what is now known as Wallace's Line. This was a prodromus to the eagerly expected narrative of his travels, discoveries, and explorations which appeared in 1869 under the attractive title of 'The Malay Archipelago; the Land of the Orang Utan and the Bird of Paradise.' That it has been reprinted more than a dozen times is sufficient evidence of its scientific value and the measure of its appreciation by the public. The only other two books of travel to be compared with it for interest are Bates' 'Naturalist on the Amazon' and Darwin's 'Voyage of the *Beagle*.' From this time till the end of his life Wallace's pen was never long idle. In 1870 appeared his 'Essays on Natural Selection;' and in 1876 his *magnum opus* 'The Geographical Distribution of Animals.' "This grand and memorable work," to quote Darwin's appreciation of it, "will last for years as the foundation for all future treatises on Geographical Distribution." The author intended it to be a contribution amplifying chapters x. and xi. of 'The Origin of Species,' which Darwin accepted as "the highest conceivable compliment" paid to him. In 1880, Wallace produced his 'Island Life,' a volume with an alluring title, which has given, and will long continue to afford, pleasure of the most elevated sort to all lovers of Nature, and attract many to visit the regions of the globe so delightfully described therein. To the same category belongs his 'Darwinism' and his 'Tropical Nature,' the latter a volume of essays on a variety of interesting subjects, philosophically treated, bearing on life in the equatorial zone.

The epoch-marking results of Wallace's life-work—as of Darwin's—must be credited to the observations he was enabled to make as a traveller and explorer, and are to be rightly claimed as triumphs for geographical science. It is to this aspect that we have mainly confined our review of the accomplishments of this illustrious Fellow of the Society.

This is neither the place nor the occasion to do more than refer to the strong convictions he has given expression to upon spiritualism, vaccination, the nationalization of the land, and many other social subjects. Whatever may be the final verdict on his opinions and theories on these subjects, there can be no question that Wallace passed nothing from his pen that he had not carefully weighed, and which he believed to be scientifically sound and for the advancement of natural knowledge, or the benefit or amelioration of his fellows.

Wallace was a man of extraordinary energy, with a vast capacity for work. His literary activity was extraordinary; he laid aside his pen only to die. He was a retiring man, but ever ready to give of his rich experience to those especially who, impelled by a real love for natural history, were anxiously meditating to follow his own conspicuous example. The present writer is only one among many who can gratefully recall how fully, kindly, and even enthusiastically Wallace entered into the plans formed for his visit five and thirty years ago to the Eastern Archipelago, and for all his wise criticism and sound and most helpful advice. His sympathies were of the widest. What he considered wrong, oppressive, or unjust, wherever it occurred, moved him strongly. He possessed an even temper, and maintained wonderful patience amid the dangers, difficulties, and annoyances of travel. Notoriously magnanimous, unselfish, unspoiled by his honours and his fame, his mind showed all the elements of nobility.

Upon such a man honours would inevitably be showered. His genius and abilities were recognized both at home and abroad. Of his many distinctions the following may be mentioned; the Fellowship, the Royal and the Darwin Medals of the Royal Society; the Founder's Medal of the Royal Geographical Society; the first Darwin-Wallace Gold Medal of the Linnean Society specially struck in 1908 to commemorate the fiftieth anniversary of the reading of the joint papers by Darwin and himself; the degree of LL.D. from Dublin and of D.C.L. from Oxford; and the

Gold Medal of the Geographical Society of Paris. In 1881 Wallace was granted a Civil List pension, and in 1908 the King conferred upon him the high distinction of the Order of Merit.

HENRY O. FORBES.

Colonel Gore.

Colonel St. George Corbet Gore, R.E., C.S.I., who died recently in England after a long illness, and who was Surveyor-General of India from 1899 to 1904, was an Australian. He was born at Parramatta, New South Wales, in 1849, and was educated at Lancing College. Commissioned in 1870, he went to India in 1872 and served in that country until his retirement. Colonel Gore was one of the few men who have been equally distinguished in both the main branches of the departmental work of the Indian Survey. Being gifted with exceptional talent as mathematician, the strictly scientific side of that department probably appealed to him most; and his clear vision of the essential necessity for the extension of geodetic triangulation beyond the political borders of British India no doubt largely tended to secure the basis for the vast accumulation of trans-frontier mapping which was secured in his time. Strict accuracy in all details of observation and record was his ideal, and his patience and perseverance in attaining the best possible results under the worst possible conditions was quite extraordinary. I had the opportunity of observing this trait in his character during the long process of determining the Russo-Afghan frontier in 1884–86. Previously to that period of special service Gore had been in the field of Afghanistan during the war of 1879–80, and he was present with General Sir Donald Stewart at the battle of Ahmed Khel. On that occasion he was actively employed as topographer, and the incident of a pitched battle in front of him did not prevent the continuation of his work with the plane-table on a small hill overlooking the plain where the fighting took place. He had time for a most excellent view of the progress of that remarkable engagement, which appeared at one time likely to end in a disaster which would have been little better than that of Maiwand. It did not appear to disturb him. He completed his work, and it is due to him that we have any map whatever of that district. It is the only map record which we possess. It was as topographer again that he did such excellent service during the Russo-Afghan boundary commission; but here his scientific mind was greatly exercised in assisting to devise a sound scheme for securing a basis of fixed points on which to frame his mapping without ordinary triangulation. Triangulation was impossible owing to the pace at which the commission party moved. The success of the methods then initiated was largely due to him, as was also the determination of the longitude of Mashad by means of the telegraph. This, indeed, was an invaluable factor in all subsequent operations. As a topographer Gore was a true artist, and there are not many first maps of any country in the world which exhibit such finish combined with so great accuracy as those for which he was responsible. Gore was a keen observer of everything of interest about him, and he was something of what Americans call a "bug" hunter. It was his inveterate habit of loafing along the route with his eye on every bush likely to yield new objects for his natural history collection that led the Turkman crowd who followed him about in the Oxus regions, and who were invariably mounted (they could not conceive it possible that any one should walk if he could ride), to the conclusion that he was the alchemist of the party. To him was due the ever-flowing stream of rupees which watered the progress of the commission. The amount of milk which he consumed also had

something to do with it; but they could not understand how an officer who possessed such powers could appear in public in such a (comparatively) shabby outfit. One Turkman gentleman in gorgeous apparel, seated on a magnificent steed, was heard to appraise the full value of Gore's clothes at two rupees! When he left the commission party on the Oxus, Gore travelled southwards by a route to India along the Persian border, which was then absolutely unknown and unmapped. He carried his mapping along the centre route to Bandar Abbas, and filled in a geographical gap of great interest and importance. Of his subsequent career in the less exciting field of India's domestic surveys, I have little knowledge. His general disposition, his kindly thoughtfulness for the welfare of all about him must always have endeared him to his colleagues, whilst his high scientific attainments fully qualified him for the responsible administrative positions which he finally held. His wife died before him, and he lost his only son during the Egyptian campaign under Kitchener. He leaves one married daughter.

T. H. Holdich.

H. F. B. Lynch.

We regret to record the death, in his fifty-second year, of Mr. Henry F. Blosse Lynch, a member of this Society since 1890, and known to geographers for his travels and studies in various parts of Western Asia, on which he was recognized as an authority. He died at Calais when on his way home from France, having only a few days before caught a chill which developed into pneumonia and ended fatally on November 24 last.

Mr. Lynch was the son of Mr. T. K. Lynch, of county Mayo, and grandson, on his mother's side, of Colonel Robert Taylor, of the Indian Political Service. At the time of his death he was the senior partner of the well-known firm of Lynch Brothers, long a worthy representative of British commercial activity in Mesopotamia and Western Persia. Educated at Eton, Heidelberg, and Trinity College, Cambridge, he graduated with first-class classical honours, and in 1887 was called to the Bar at the Middle Temple. Early in 1889 he began his travels in Western Asia in the interests of his firm, journeying from Aleppo to Diarbekir on horseback, and descending the Tigris on a raft to Baghdad. At this time the Karun river had lately been thrown open to general commerce by the Persian Government, and it was to the utilization of the facilities thus obtained that Mr. Lynch now devoted his attention. After an examination of the lower and middle Karun, below and above the rapids of Ahwaz which form the chief obstruction to navigation, he proceeded to Shuster, and thence, in company with Mr. Holland, made the journey to Ispahan across the Bakhtiari mountains, studying the possibilities of communication by this route in the interest of commerce.* The journey resulted eventually in the opening of a regular route from Shuster to Ispahan, which has come to be known as the "Lynch road." On his return to England, he took part in the discussion which followed the paper read in May 1890 by our present President on the Karun river and South-Western Persia, and soon afterwards contributed to the *Proceedings* (vol. **12**, pp. 533–553) a paper describing his journey in Persia, under the title "Across Luristan to Ispahan." A second paper, on the Karun river, appeared in the next volume of *Proceedings*. By this time, regular navigation had been established both on the upper and lower Karun.

In 1893 Mr. Lynch set out once more for the East, this time bound for Armenia,

* A similar study of the route had been made a few years previously by the late Sir George Mackenzie, though it led to no immediate result.

to which he had felt a particular attraction. He travelled extensively in that country, and made the ascent of Mount Ararat. In 1898 he returned to Armenia in company with the competent geologist, Dr. F. Oswald, who gave him valuable help in his observations, and who eventually published the results of his more special researches in a volume printed by himself. Among the most valuable pieces of work done during this second visit was the first thorough examination of the great crater of Nimhud Dagh, nearly 5 miles in diameter. Mr. Lynch brought out the general results of his two journeys in a two-volume work, entitled 'Armenia: Travels and Studies,' profusely illustrated from his own photographs, and accompanied by a map in which all the available material, besides his own and Dr. Oswald's observations, was fully utilized. In June, 1895, he had read before the Society a paper on the earlier journey in Armenia, which, however, was never published.

In 1906, Mr. Lynch entered Parliament as Liberal member for the Ripon division of Yorkshire, but lost the seat in January, 1910. Both in Parliament and in the Press he took part in discussions on Persian and other West Asiatic topics, on which his views were listened to with respect, though frequently at variance with the Government's policy in those matters.

Colonel G. E. Gerini.

Colonel Gerini, well-known as a writer on Siam and Eastern Asia, died at Turin, in October 1913, at the age of fifty-three. A short notice of him appears in the *Bolletino* of the Italian Geographical Society for November. Although an Italian both by birth and education, his long residence in the East had made him familiar with things English, and he had a thorough mastery of that language, both written and spoken. Born at Cisano d'Albenga in 1860, and educated at Turin and at the Military School at Modena, he served for some years in the Italian army, and then turned his attention to Siam as likely to offer a more favourable scope to his ambitions. He was appointed Instructor of the Royal Guard, and was soon afterwards charged with the organization of a military school, which met with such success that he became Director of Military Instruction to the whole Siamese army. During his twenty-five years' stay in that country he devoted himself to the study of Siamese literature, and to historical, geographical, and archæological researches. He paid special attention to Ptolemy's geographical description of the Far East, and put forward the results of his studies in the substantial work brought out under the auspices of the Royal Asiatic and our own Society in 1909. Although his views did not find full acceptance with students, the work embodied a vast amount of painstaking research, and pointed the way to further lines of inquiry by others. He was the author of numerous shorter papers and memoirs in Italian, English, French, and Siamese.

A. E. S. Laughton.

We regret to record the death of Arthur Edward Seymour Laughton, son of Sir John Knox Laughton, R.N. Mr. Laughton, who was born at Greenwich on October 16, 1875, and was married to Nadine, daughter of Mrs. Zelia Nuttall, was murdered by bandits at Coahuayana, Michoacan (Mexico), on August 23, 1913. For some years past he had been employed in Mexico as a mining and civil engineer, and at the time of his death was employed in superintending some large irrigation works. Before going out to Mexico he had taken the course of surveying under the Society's instructor, and was one of the first to receive the diploma given for

proficiency in the subject. The crime appears to have been the result of a local plot, in which the Jefe Politico and priest of the village were concerned, to seize the money for the pay-roll which had just arrived from Mexico. Mr. Laughton and his companion, Mr. Eric von Thaden, were both shot dead through the windows of the house.

CORRESPONDENCE.

Tribal Movements in Africa.

Beauvais, November 21, 1913.

I HAVE the honour to thank you for the study the *Geographical Journal* has devoted to my memoir on the Jaga and Zimba. I have deeply felt the praise bestowed upon my work by Sir Harry Johnston, and still more his criticisms. I prize highly the good opinion of the eminent "Africanist" and that of all the Fellows of the Royal Geographical Society. Please allow me to plead not guilty.

1. Sir Harry H. Johnston reproaches me with having "just missed reading the works of several writers which throw a considerable new light on the migrations of the African peoples." Sir Harry H. Johnston has undoubtedly believed that my purpose was to write a general history of all the migrations of the African peoples. *Tantæ molis erat!* My aim was only to study those that were in some way connected with the Jaga and Zimba. I have read, I assure you, the beautiful historical work of M. Delafosse, the memoirs of Torday and Joyce, and, last not least, 'George Grenfell and the Congo.' Among all those important works the following only have provided me with some document for my study: 'Notes on Bayaka' and 'Ethnology of the South-West Congo State' of Torday and Joyce, which works I have quoted in pages 65, 81, 84, 85, 89, 94, 95, 97, 98, 102, 142 of my memoir. I may even add that the work of Mr. Delafosse was only published six months after my memoirs had been handed over.

2. I own not having gone back to the work of Dr. McCall Theal, but on the faith of titles, I have thought the learned historian had written only about the peoples south of the Zambezi. As soon as I learnt that he had written about the Zimba I perused his last great work, 'History and Ethnography of Africa.' I have noticed that on this special point he has no other sources but Dos Santos and Diogo do Couto, and that he had neglected or had not been acquainted with Jarric and Faria y Souza (*cf. op.* Cand., 1, pp. 352–354). In spite of Dr. McCall Theal's authority, I am obliged to maintain what I have written in my memoir (pp. 43–57); the name of Zimba has been given in East Africa to populations having no other common character but cannibalism, and having no affinity with either the Jaga or the Kioko, which I also, be it said by the way, have identified with the Jaga (pp. 95–101), and still less with the populations of the western coast: the Zimba of Mombasa were Galla; those of Kilwa, A-yao; those of Mozambique, Ma-kwa; those of the Zambezi, A-ryanja. Lastly, if the name of Segeju is in fact borne by Negro-Hamitics—I have written it myself, p. 56—it is borne also by Masai (*cf.* Schoeller, 2, p. 226), and those of Malindi were or have become Bantu; we have on this point the explicit testimony of Krapf, von der Decken, Farler, Cust, Le Roy.

3. I may have been occasionally going wrong in my etymologies—to err is easy on this dangerous ground. But I think my errors are few, and in all cases they are not caused by my "misapprehension of Bantu." For the last fifteen

years I have been studying the comparative grammar of the Bantu tongues, and I have practised myself *in situ* several Bantu dialects of West Africa: the Mpongwe, the Fan, and the Vili of Loango. I grant, however, that my etymology of "Mundequete" is not exact.

R. AVELOT.

I do not wish to labour too much my points of difference with Captain Avelot in regard to his interesting pamphlet on 'Racial Migrations in Africa,' but in respect to the letter printed above, I still maintain that, though he may have studied the works of Mons. Maurice Delafosse, he did not give the deductions of that author sufficient consideration in his pamphlet; and that, although he may have read the earlier articles of Torday and Joyce, I could find no reference to the most important work of those two authors, the monograph on the Bushongo civilization, published by the Congo Museum at Tervueren.

Dr. McCall Theal, it must be remembered, printed in the original Portuguese the text of most of the late fifteenth and sixteenth century Portuguese writers on South-Central and East African geography. A reference to these works establishes—in my opinion, beyond all reasonable contestation—that the invading hordes known most frequently by the name of Bazimba originated in the region of the upper Kwango, and were identical with the modern Imbangala and Bajok. It was these same south-west Congo cannibals that ravaged the kingdom of Kongo and Loango, much of interior Angola, nearly all Zambezia, the interior of Mozambique, the Kilwa coast, and the Mombasa district. Most emphatically they were not Gala. Neither in actual history nor tradition are the Gala, or any other Hamitic race, associated with cannibalism. Nor were East African Galas or Somals—judged from Arab records—in the same state of utter savagery as were the Bazimba described by the Portuguese and Arabs. Nor is there anything in history, archæology, or language-study to suggest that this invading horde which swept up through East Africa from the south, had any affinity with the modern Yao or Makua.

I can see that Captain R. Avelot is to be respected as an authority on the north-west Bantu languages, but I do not think he has had equal opportunities to grasp the features of eastern and south-central Bantu, in which direction his few errors in etymology are to be detected. But in general my criticisms did not underrate the interest or importance of his pamphlet. May I, without impertinence, draw attention to his letter—printed above as it is written—as an interesting sign of the times? It is one which might pass current anywhere as the letter of an Englishman. It is pleasant to be able to record, from my own knowledge of France and French officers of to-day, that there now many officials, civil as well as military, in the French service who can write English with much the same ease and perfection as Captain Avelot.

H. H. JOHNSTON.

Geography of National Culture.

Budapest, November 30, 1913.

Compelled by the review of my 'Geography of National Culture' in the last (July, 1913) number of your valuable paper, I beg you to favour me by giving space to the following remarks. It is not my purpose to dispute with my reviewer; to do it effectively I would have to write quite a new book; I only wish to call the attention of the impartial English public to the following facts:—

(1) My book consists of eleven chapters, and from those five only were analyzed by the reviewer, and the most important paragraphs were put aside. (2) As to the scholars mentioned in the second paragraph of the review, all I wished to state was that they belong to the evolutionist school. (3) The terms "geogony" and "geosophy" I only applied to Dr. Loczy's puristic geography; as to Prof. Penck, I said that he does not approve one-sided physical consideration of geography. (4) Everybody will agree that reviewing does not consist in refuting a man's opinion by quoting stray sentences, which, when cited alone without their context, are often incompatible with the author's meaning; and it is evident that such imperfect quotations are often detrimental to the author's reputation. To this class belongs the quotation about Newton, the sense of which simply is that, though he discovered the fact of gravitation, about its cause he knew as little as we do. (5) The leading idea of my book, *i.e.* that man's intellect is a higher power in the development of humanity than the mere morphology of the terrestrial globe, and consequently a very important factor in history, caused the strongest reaction of the dominating morphologists' party, and since the publication of my book I have been the object of continuous rebukes. Still, I alone do not hold this idea; I share it with Partsch, Passarge, and Reclus, to whom descriptive geography is far more important than the physiographical treatment of this science. I agree with Colonel Close, who wrote: "We have the right to use the results obtained by others (economic, historic, politic), provided that we add something *valuable* of our own," and "He (the geographer) can do much to popularize the objects, but he cannot hope to do original work" (*Geographical Journal*, October, 1911, pp. 407, 409.)

Prof. Dr. Géza Czirbusz.

Altitude Insomnia.

During my prolonged absence in Asian wilds, certain statements have been made at meetings of the Royal Geographical Society and elsewhere ascribing to me opinions which I have not entertained or advocated. I would call attention to one such statement, which has obtained wide currency and has been repeated by Dr. de Filippi both in papers he has read and in his book, 'Karakoram and Western Himalaya.' On p. 316 of the last he writes, "Dr. Workman . . . believes it impossible to sleep at heights of over 20,000 feet." I desire to say here I have never asserted any such belief. I have expressed an opinion, based on the altitude-experiences of ten Europeans on two expeditions, that in attempts to scale the highest peaks, insomnia might be found a serious obstacle to success—quite a different proposition from the sweeping belief attributed to me. I did not claim that all or any definite proportion of mountaineers would suffer from insomnia above 20,000 feet.

With a further experience of four more expeditions, I consider my suggestion as phrased needs no qualification. The fact that the Duke of the Abruzzi with three companions passed nine nights* at over 20,000 feet does not invalidate its force, nor obliterate the experience it was based on, nor prove that all mountaineers would be exempt from insomnia or mountain sickness at such heights, any more than the

* Dr. de Filippi asserts on p. 364, 'Karakoram and Western Himalaya,' that seven Europeans spent nine days at a height of over 20,700 feet, but on p. 317 he states that three porters descended on July 13 to Base Camp, 16,637 feet, and did not return until July 16, thus reducing the number who remained nine days to four.

immunity of some persons to enteric fever and variola proves that these diseases have lost their power to scourge mankind.

While some persons may be able to sleep at any altitudes that may in future be reached, sufficient evidence, even at altitudes considerably below 20,000 feet, has been recorded, to show a strong probability against every climber being able to do so. As confirming our own experience in this regard, I may state, a number of young and vigorous sportsmen in Himalaya have told me they could not sleep well at 15,000 feet, and have experienced other altitude effects. One said he was used up at 13,000 feet. I have known several apparently healthy persons, who have suffered so much from insomnia, circulatory and respiratory disturbance at 10,000 feet that they have been obliged to descend to lower levels. I have known of one instance and heard of others, where for the same reason an altitude of 5000 feet could not be endured.

In addition to the above, much confirmatory testimony to the occurrence of insomnia at comparatively low altitudes (15,000 to 17,000 feet) has been brought to my notice during the last three years in conversation with persons having a practical acquaintance with Himalayan uplands. Without any allusion to insomnia on my part, I have been asked time after time with surprising frequency, whether we could sleep at the altitudes at which we have done much of our work. This question has invariably been followed by the remark, that the questioner, having attained some such moderate altitude as that mentioned, had either been unable to sleep at all, or, at best, but little. My primary suggestion is therefore borne out by such a volume of the smoke of actual experience as to place the burden of proof upon those who assert or imply, that no fire of truth lies beneath that smoke.

In the light of the above evidence the mention of 20,000 feet as the altitude at which insomnia began to seriously affect our party, and the suggestion that, in attempts on the highest peaks, at considerably greater altitudes, it might prove an obstacle to success, appear to be well within the bounds both of experience and probability.

W. Hunter Workman.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1913-1914.

Second Meeting, November 24, 1913.—The Right Hon. Earl Curzon of Kedleston, G.C.S.I., G.C.I.E., etc., President, in the Chair.

Elections.—*Lieut. Hamilton Stirling Alston (Rifle Brigade); Miss Lilian Edith Ambrose; Graham Baron Ash; Miss Sydney Dorothy Arundel; Bernard Thomas Balding; W. G. H. Ballantine; Mrs. Helen Bannon; Wilfrid Beaver; Eastman Bell; Henry James Bell; Lieut. R. Benson (9th Lancers); Miss Sara Bibby; Ernest A. E. Binstead; Walter H. Bird; Samuel Bramwell; Rear-Admiral The Hon. Thomas Seymour Brand; Joseph Burtt; Lewis Byron; Mrs. Charlotte Cameron; Bertram Carr; Charles P. Caspersz; Cecil J. Chadwick; Charles Churchill; Frank Jackson Collier, B.Sc.; Henry N. Warner Collins; Miss Clara Lavinia Corfield; Mrs. Evelyn Glanvill Corney; O. G. S. Crawford; Lady Darwin; Albert Charles Dath; Mrs. Sarah D'Aubigné; Lieut.-Colonel James Domville; Reginald Stair Douglas; G. H. S. Dovers; Charles John Geast Dugdale, B.A.; Captain Sir George Duff-Sutherland Dunbar, Bart.; Commander J. A. Edgell, R.N.; Arthur Cecil Edwards; Edward W. Evans; Lady M.*

Evans; Robert Charles Evans; Charles Reginald Morris Eyton; Charles Feleky; The Hon. Denys Finch-Hatton; Mrs. K. R. Fletcher; W. Robert Foran; William Garden; Alan Garnett; Mrs. F. G. Gerard; Mrs. H. S. Gibbon; Miss Agnes Gibson; Frank Gleadow, F.R.M.S.; Mrs. Alfred Goldsmid; Major Sir Hamilton Goold-Adams, G.C.M.G.; Miss Violet Strathearn Gordon; Miss Margaret Elizabeth Gray; Arthur M. Grenfell; Riversdale Grenfell; Reginald Palmer Greville; The Right Hon. Sir Edward Grey, K.G.; Mrs. Hall; Mrs. W. G. Hall; Miss E. M. Harker; V. A. Cæsar Hawkins; Edward Alan Hay; Mrs. Julia W. Henshaw; Herbert William Hollebone; Señor Don Otto Holstein; Lieut. F. W. Hudson (Norfolk Regt.); Miss Rachael Humphreys; William P. Hunter, J.P.; Andrew Bain Irvine; Miss Vera Isaac; H. Stuart Maclean Jack; Mrs. F. E. Jackson; Mrs. Rachel W. Jervoise; Captain Henry V. Kershaw; Harry Frederick Knapp; Frank Henry Landsberg; John Lapraik; Miss Vera Larminie; Miss Lucy F. Locock; Alexander Macdonald; Mrs. Lilian Mary I. Macdonald; Miss Violet Markham; Mrs. Charles Bruce Marriott; R. E. Martin; Miss McClean; Henry Foster McClintock; George Seaton Milde; Frank Marshall Milligan; Rev. Wm. C. Minifie, Ph.D., D.D; Cecil Frank Molyneux; Edward Robert Morris; M. H. Moyes, B.Sc.; P. Nesbitt; George W. Neville; Robert Saville Newling; Lancelot Oliphant; Sidney Olliver; Eric Uniacke O'Bryen Oyler; Lieut. Wm. Haviland Parkinson (Gloucestershire Regiment); Sir Hubert Parry, Bart., C.V.O., Mus.Doc.; Mrs. Ernest Payne; Mrs. Ferdinand M. Peacock; Captain A. W. Pearse; Harry Brian Pearson, M.D.; Miss Helen d'Court Penruddocke; Hans von Pernull; Captain T. A. Preston (East Lancashire Regiment); Hermann Edward de Pury; Miss Kate Qualtrough; Charles E. C. Ralph; Ernest Percy Ray; Miss Alice Ethel Redpath; Mrs. E. Reeder; Miss Ellen Rickard; Robert Windsor Rickards, J.P.; D. H. W. Ritchie; Captain G. F. Rugg, R.A.M.C.; F. McClure Sclanders; George Bernard Sellers; Francis Joseph Sharpe; Hector Mackenzie Shaw; Captain C. W. Shearme (Royal Indian Marine); Mrs. Mary Alice Shotton; Colonel E. S. St. Barbe Sladen, J.P.: Alex. Findlay Smith; Harrison W. Smith; Hubert Conrad Sparks; Hugh Spencer, C.I.E.; Robert Smith Steedman; Miss Beatrice C. E. Stewart; Rev. Frederick Stubbs; Ven. Archdeacon Hudson Stuck, D.D.; J. Sutherland; Lady Sykes; T. Isaac Tambyah; Robert C. Taylor; William T. Taylor; Miss Marion Thom; Captain Harold Hay Thornburn; Edward Phillips Turner; Mrs. Robb de Peyster Tytus; Albert Vandam; W. Ernest Veevers; Horace Stokes Waite; Mrs. Henrietta Maria Walter; James Watt; Lieut.-Colonel Benjamin Way (4th Stafford Regiment); Miss Gertrude Whibley; J. M. Whitting; Frank Wild; Frank Edward Wilkins; Edith, Countess of Winchilsea and Nottingham; Thomas William Wood.

The papers read were:—

"The Exploration of the Siachen or Rose Glacier, Eastern Karakoram." By Mrs. Bullock Workman; and "Physical Characteristics of the Siachen Basin and Glacier-system." By Dr. Hunter Workman.

Third Meeting, December 8, 1913.—The Right Hon. Earl Curzon of Kedleston, G.C.S.I., G.C.I.E., etc., President, in the Chair.

Elections.—*Frederick Gray Aldous; Harry Allaun; Lieut. Peter Paul Ritter von Bauer; Colonel Sir Horace G. P. Beauchamp, Bart., C.B.; Robert J. Bishop; John Davies; Richard Mountford Deeley; Mrs. Adelaide Eastburn; F. Elliott; Reginald Frederic Gaunt: Sir Lancelot Hare, K.C.S.I., C.I.E.; Miss Ethel C. Hargrove; Miss Fanny Maddock; Allen Nicolson; Countess Dorothy Nollitor;*

Mrs. Charles Schäffer; Lieut. John Codman Soley (U.S.N.); F. W. Starr; Miss Ella Sykes; Cecil C. Thompson; Miss A. M. Thornton; Leo K. Vanderveen; William Gordon Wise.

The paper read was:

"Is the Earth drying up?" By Prof. J. W. Gregory, F.R.S.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
Jber. = Jahresbericht.
k.k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. = (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Crete. **Trevor-Battye.**

Camping in Crete, with notes upon the animal and plant life of the island. By Aubyn Trevor-Battye. London: Witherby & Co., 1913. Size 9 × 6, pp. xxi. and 308. *Maps and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publishers.*

Germany—Silesia. **Frech and Kampers.**

Schlesische Landeskunde. (2 vols.) Naturwissenschaftliche Abteilung . . . herausgegeben von Dr. Fritz Frech (pp. xx. and 502); Geschichtliche Abteilung . . . herausgegeben von Dr. Franz Kampers (pp. xviii. and 454). Leipzig: Veit & Co., 1913. Size 10½ × 7. *Maps and Illustrations. Price M.*32.

Holland—Gazetteer. **Pott.**

Aardrijkskundig woordenboek van Nederland, met toestemming van den Heer Directeur-Generaal der Posterijen en Telegrafie mede uit officieele gegevens samengesteld door M. Pott. Tweede druk. Groningen: J. B. Wolters, 1913. Size 8 × 5, pp. vi. and 538. *Price* 3 *fl.* 90.

Italy—Climate. **Eredia.**

Filippo Eredia. La variazione diurna della temperatura in Italia. (Estratto dagli Annali del R. Ufficio Centrale di Meteorologica e Geodinamica, vol. 34, parte 1.) Rome, 1912. Size 13½ × 10, pp. 43. *Sketch-maps.*

Italy—Erosion. *B.S.G. Italiana* **2** (1913): 637–660. **Azzi.**

I fenomeni della erosione nelle sabbie gialle del pliocene nel bacino del Correcchio (Romagna). Del Dott. Girolamo Azzi. *Diagrams and Illustrations.*

Italy—Genoa—Shore-line. **Omodei.**
R. Com. Talassogr. Italiano, Mem. **12** (1912): pp. 27.

Sulle condizioni della spiaggia de Chiavari-Lavagna. Relazione del Prof. D. Omodei. *Plan, Illustration, and Diagram.*

Italy—Lake Maggiore. *B.S.G. Italiana* **2** (1913): 817–830. **Pullé.**

Brevi note antropogeografiche sulle Valli Grande e d'Intragna (Lago Maggiore). Del Prof. Giorgio Pullé. *Sketch-map.*

Italy—Liguria. *Riv. G. Italiana* **20** (1913): 58–65. **Aicardi.**

La popolazione nella Riviera Ligure dal 1861 al 1901. Di Giacomo Aicardi. *Sketch-maps.*

Italy—Lipari Islands. **Platania.**

Prof. Giovanni Platania. Intorno ad alcune sorgenti termali nelle isole Eolie. (Dal Bollettino dell' Accademia Gioenia di Scienze Naturali in Catania, Fasc. XV, Ser. 2ª.) Catania, 1911. Size $9\frac{1}{2} \times 6\frac{1}{2}$, pp. 6. *Diagrams.*

Italy—Po. *B.S.G. Italiana* **2** (1913): 597–612. **Pantanelli.**

Fossa angusta o fossa Augusta. (Questione pliniana sul corso di Po.) Del Prof. Dante Pantanelli.

See note in the Monthly Record, December, 1913.

Italy—Po basin—Rainfall. *Riv. G. Italiana* **20** (1913): 43–48. **Anfossi.**

La precipitazione media nel bacino del Po. Di G. Anfossi. *Sketch-map and Diagram.*

Italy—Population. *B.S.G. Italiana* **2** (1913): 381–394. **Cianetti.**

Superficie e popolazione d'Italia. Del Prof. Enea Cianetti.

Italy—Sicily—Etna. **Ponte.**
Atti R.A. Lincei: Ser. V., Rendiconti, Cl. Sc. fisiche **22** (1913): 1 *Sem.* 502–507.

Sulla indipendenza delle acque sotterranee dell' Etna dalle precipitazioni atmosferiche. Di G. Ponte.

Italy—Venetia—Hydrology. **(Stefanini.)**
R. Magistrato alle Acque, Uff. Idrogr., Pubbl., **20–21** (1912): pp. 72.

I bacini della Meduna e del Colvera in Friuli. (Del Dr. Giuseppe Stefanini.) *Maps, Illustrations, and Diagrams.*

Italy—Venetia—Hydrology. *B.R. Com. Talassogr. Italiano* (1912): 401–403. **Valenti.**

Sulla variazione di salsedine nelle acque della laguna veneta in rapporto con la marea. Del dott. Lorenzo Valenti.

Italy—Venetia—Meteorology. **Ufficio Idrografico.**
R. Magistrato alle Acque: Uff. Idrogr., Pubbl. No. **33** (1911): pp. 29.

Carte annuali delle pioggie nella regione veneta per il 1909 e 1910. *Maps.*

Mediterranean. **Philippson.**

Das Mittelmeergebiet: seine geographische und kulturelle Eigenart. Von Alfred Philippson. 3. Auflage. Leipzig: B. G. Teubner, 1914 [1913]. Size 9 × 6, pp. x. and 256. *Sketch-maps and Illustrations. Price M.6. Presented by the Publisher.*

The first edition of these valuable sketches was reviewed in vol. **24**, p. 343. It has now for the second time been revised and brought up to date, account being taken of new data in the fields of geology, climatology, etc.

Norway. **Armistead.**

Ten years near the Arctic Circle. By J. J. Armistead. London: Headley Bros., 1913. Size $7\frac{1}{2} \times 5$, pp. 252. *Illustrations. Price 3s. 6d. net. Presented by the Publishers.*

Experiences of a missionary's life "in boats, in tents, and in the houses of the people, to say nothing of nights spent out under a blanket on the bare hillsides" on the coasts and islands of Northern Norway. It gives an excellent idea of the conditions under which the work is carried on.

Russia—St. Petersburg. **Keller.**

St. Petersburg and its environs; Finland, Moscow, Kiev, Odessa, Warsaw, Riga; a tour on the Volga; the Crimea and the Caucasus. By Otto Keller. (St. Petersburg, 1913.) Size 7 × $4\frac{1}{2}$, pp. iv. and 168. *Map, Plans, and Illustrations. Price 4s. 6d.*

Switzerland. **Benson.**

Winter sports in Switzerland. By E. F. Benson. London: G. Allen & Co., 1913. Size 10½ × 7½, pp. viii. and 197. *Illustrations. Price* 15*s. net. Presented by the Publishers.*

Turkey. **Launay.**

L. de Launay. La Turquie que l'on voit. Paris: Hachette & Cie., 1913. Size 7½ × 5, pp. 269. *Maps and Illustrations. Price* 4 *fr. Presented by the Publishers.*

United Kingdom—Gloucester. **Chubb.**

A descriptive catalogue of the printed maps of Gloucestershire, 1577–1911; with biographical notes. By T. Chubb. [Bristol, 1913.] Size 9 × 5½, pp. 238. *Facsimile-maps. Presented by the Author.*

Western Europe—Ethnography. **Leeds.**

The archæology of the Anglo-Saxon settlements. By E. Thurlow Leeds. Oxford: Clarendon Press, 1913. Size 9 × 6, pp. 144. *Maps and Illustrations. Price* 5*s. net. Presented by the Publishers.*

ASIA.

Asia—Exploration. **Barthold.**

Die geographische und historische Erforschung des Orients, mit besonderer Berücksichtigung der russischen Arbeiten. Von Prof. Dr. W. Barthold. (Quellen und Forschungen zur Erd- und Kulturkunde . . . herausgegeben von Dr. R. Stübe; Bd. 8.) Leipzig: O. Wigand, 1913. Size 10 × 7, pp. xiv. and 225. *Price M.*15.

China. **Johnston.**

Buddhist China. By Reginald Fleming Johnston. London: J. Murray, 1913. Size 9 × 5½, pp. xvi. and 403. *Sketch-map and Illustrations. Price* 15*s. net. Presented by the Publisher.*

China—History. **Gowen.**

An outline history of China. Part 2: From the Manchu Conquest to the recognition of the Republic, A.D. 1913. By Dr. Herbert H. Gowen. Boston: Sherman, French & Co., 1913. Size 8 × 5½, pp. vii. and 216. *Illustrations. Price* $1.20. *Presented by the Publishers.*

Cyprus—Archæology. **Ohnefalsch-Richter.**

Griechische Sitten und Gebräuche auf Cypern; mit Berücksichtigung von Naturkunde und Volkswirtschaft, sowie der Fortschritte unter Englischer Herrschaft. Dargestellt von Magda H. Ohnefalsch-Richter. Berlin: D. Reimer, 1913. Size 10 × 6½, pp. xiii. and 369. *Map and Illustrations. Price Mk.*16. *Presented by the Publisher.*

India—Coalfields. **Ball and Simpson.**

Mem. Geol. Surv. India 41 (1913): pp. 148 and xliv.

The coalfields of India. By the late Prof. V. Ball. Entirely revised and largely rewritten by R. R. Simpson. *Maps and Illustrations.*

India—Ethnology. **Anderson.**

The peoples of India. By J. D. Anderson. Cambridge: University Press, 1913. Size 6½ × 5, pp. xii. and 118. *Sketch-maps and Illustrations. Price* 1*s. net. Presented by the Publishers.*

India—Handbook. **Bædeker.**

Indien: Handbuch für Reisende von Karl Bædeker. Leipzig: A. Bædeker, 1913. Size 6½ × 4, pp. lxxiv. and 358. *Maps and Plans. Price Mk.*20. *Presented by the Publisher.*

India—Himalaya. **Haughton.**

Sport and folk-lore in the Himalaya By Captain H. L. Haughton. London: E. Arnold, 1913. Size 9½ × 6, pp. ix and 332 *Illustrations. Price* 12*s.* 6*d. net. Presented by the Publisher.*

India—Survey. **Burrard.**

General Report on the operations of the Survey of India during the survey year 1911–12. Prepared under the direction of Colonel S. G. Burrard. Calcutta, 1913. Size 14 × 9, pp. 36. *Maps.*

Japan. **Longford.**

The evolution of new Japan. By J. H. Longford. Cambridge: University Press, 1913. Size 6½ × 4½, pp. vi. and 166. *Map and Illustrations. Price* 1*s. net. Presented by the Publishers.*

Japan—Minerals. **Iwasaki.**
J. College Sc., Imp. Univ. Tokyo **32** (Art. 8) (1912): pp. 24.
The metallogeny of the Japanese Islands. By C. Iwasaki. *Map and Sections.*

Malay Archipelago—Celebes. **Grubauer.**
Unter Kopfjägern in Central-Celebes: Ethnologische Streifzüge in Südost- und Central-Celebes. Von Prof. Albert Grubauer. Leipzig: R. Voigtländer, 1913. Size 9½ × 7, pp. xi. and 608. *Maps and Illustrations. Price Mk.*14.50. *Presented by the Publisher.*

Malay Archipelago—Sumatra. **Philippi.**
Ts. K. Ned. Aardr. Genoots. **30** (1913): 219–223.
De vulkaan G. Sĕkintjau in Benkoelen. (Door H. Philippi.) *Sketch-map.*

Malay Peninsula—Geology. *Quart. J. Geol. S.* **69** (1913): 343–371. **Scrivenor.**
The geological history of the Malay Peninsula. By John Brooke Scrivenor. *Sketch-maps and Sections.*

Mongolia. *G. Ts., K. Danske G.S.* **21** (1912): 289–298. **Schønebeck.**
Khalkha. Ved Alfred Schønebeck. *Sketch-map and Illustrations.*

Persia, Southern. **Survey of India.**
Survey of India. Index to names appearing on the Southern Persia sheet of the Southern Asia series. Scale, 1:2,000,000 or 1·014 inches to 32 miles. Calcutta, 1913. Size 8½ × 5½, pp. 26.

Philippine Islands—Luzon. *J. Geology* **21** (1913): 29–61. **Smith.**
The geology of Luzon. By Dr. Warren D. Smith. *Sketch-maps, Sections, and Illustrations.*

Includes a sketch of the physiography and peoples (see note in the August number, p. 195).

AFRICA.

Algeria and Morocco. **Edwards.**
The Barbary Coast: sketches of French North Africa. By Albert Edwards. New York (London: Macmillan & Co.), 1913. Size 8 × 5½, pp. xxvii. and 312. *Illustrations. Price* 8*s.* 6*d. net. Presented by the Publishers.*

Egyptian Sudan. **Peacock.**
Anglo-Egyptian Sudan. A report on the land settlement of the Gezira (Meselemia district). By H. St. G. Peacock. London: Sifton, Praed & Co., [1913]. Size 10½ × 7½, pp. 68. *Maps and Illustrations. Presented by the Publishers.*

Egyptian Sudan—Coast. **Crossland.**
Desert and water gardens of the Red Sea; being an account of the natives and the shore formations of the coast. By Cyril Crossland. Cambridge: University Press, 1913. Size 10 × 6½, pp. xv. and 158. *Sketch-maps and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publishers.*

Egyptian Sudan—Cotton. *B. Imperial I.* **11** (1913): 189–203. ——
Recent progress in cotton cultivation in the Sudan.
See note in the September number, p. 295.

French Chad Territory—Zigeï. *La G., B.S.G. Paris* **27** (1913): 321–330. **Peignot.**
Notice sur la subdivision de Zigueï. Par A. M. Peignot. *Sketch-maps.*

French Equatorial Africa. *La G., B.S.G. Paris* **27** (1913): 405–423. **Terrier.**
Les lacs du Bas-Ogooué. Mission hydrographique du Gabon. Par M. Le Terrier. *Sketch-map and Illustrations.*
The writer took part in the Audoin Mission (cf. *Journal*, vol. 41, p. 387).

French West Africa. | *Le Tour du Monde* **19** (1913): 397–482. **Marc-Schrader.**
Quand j'étais Maire de Tombouctou. Par le Capt. L. Marc-Schrader. *Sketch-map and Illustrations.*

French West Africa—Longitude. **Schwartz and Villatte.**
C.R.A. Sc. Paris **156** (1913): 1743–1745.
Sur la première détermination de différence de longitude par télégraphie sans fil en Afrique occidentale française. Par MM. Schwartz et Villatte.
Determination of the difference Konakri-Kissidugu.

Nyasaland. **Fraser.**

Winning a primitive people: sixteen years' work among the warlike tribe of the Ngoni and the Senga and Timbuka peoples of Central Africa. By Donald Fraser. London: Seeley, Service & Co., 1914 [1913]. Size 8 × 5, pp. 320. *Sketch-maps and Illustrations. Price 5s. net. Presented by the Publishers.*

Sahara—Railway. **Souleyre.**

A. Souleyre. Le Tranassharien: son utilité; ses conditions d'établissement et d'exploitation. Paris: Berger-Levrault, 1911. Size 9 × 5½, pp. 107. *Map. Price 3 fr.*

NORTH AMERICA.

Canada—British Columbia.

The Northern Cordilleran. Published by the British Columbia Mountaineering Club. Vancouver, B.C., 1913. Size 9½ × 6, pp. 50. *Maps and Illustrations.*

Includes, *inter alia*, papers on the Vancouver or Britannia range, and the Garibaldi group.

Canada—Hudson Bay—Southampton Island. **Comer.**

B. American G.S. 45 (1913): 516–518.

Additions to Captain Comer's map of Southampton Island. *Sketch-map.*

Labrador. *B.G.S. Philadelphia* 11 (1913): 170–182. **Townsend.**

A short trip into the Labrador peninsula by way of the Natashquan river. By Dr. Charles W. Townsend.

Newfoundland—Game. **Dugmore.**

The romance of the Newfoundland caribou: an intimate account of the life of the reindeer of North America. By A. A. Radclyffe Dugmore. London: W. Heinemann, 1913. Size 11 × 8, pp. viii. and 191. *Maps and Illustrations. Price 12s. 6d. net. Presented by the Publisher.*

The well-known author of 'Camera Adventures in the African Wilds' here gives the results of a thorough study of the life, habits, and habitat of the caribou of Newfoundland, illustrated by his own paintings, drawings, and photographs from life.

CENTRAL AND SOUTH AMERICA.

Bolivia. **Walle.**

Paul Walle. La Bolivie et ses mines. Paris: E. Guilmoto, [1913]. Size 9 × 5½, pp. xvi. and 444. *Maps and Illustrations. Price 7.5 fr. Presented by the Publisher.*

Central and South America—Historical. **Johnston.**

Pioneers in tropical America. By Sir Harry Johnston. London: Blackie & Son, 1914 [1913] Size 8½ × 5½, pp. 320. *Maps and Illustrations. Price 6s. Presented by the Publishers.*

Another of Sir H. Johnston's 'Pioneers of Empire' series, vividly describing the adventurous doings of early pioneers in lands which have fallen more or less under British influence. Dealing with the exploits of men like Drake, Raleigh, Dampier and other buccaneers, the present volume falls no whit behind any of its predecessors in thrilling interest.

Panama Canal. **Bellet.**

Daniel Bellet. La nouvelle voie maritime: le Canal de Panama. Paris: E. Guilmoto, [1913]. Size 8 × 5, pp. 330. *Map and Illustrations. Price 5 fr. Presented by the Publisher.*

Paraguay—Chaco. **Grubb.**

A church in the wilds; the remarkable story of the establishment of the South American Mission amongst the hitherto savage and intractable tribes of the Paraguayan Chaco. By W. Barbrooke Grubb. London: Seeley, Service & Co., 1914 [1913]. Size 8 × 5, pp. 287. *Sketch-maps and Illustrations. Price 5s. net. Presented by the Publishers.*

AUSTRALASIA AND PACIFIC ISLANDS.

New Hebrides. **Speiser.**

Südsee, Urwald, Kannibalen. Reise-Eindrücke aus den Neuen Hebriden, von Felix Speiser. Leipzig: R. Voigtländer, 1913. Size 9½ × 7, pp. v. and 308. *Sketch-maps and Illustrations. Price Mk.8.50. Presented by the Publisher.*

An English edition has also appeared (see December number, p. 594).

POLAR REGIONS.

Antarctic—German Expedition. **Drygalski.**

Deutsche Südpolar-Expedition, 1901–1903 . . . herausgegeben von Erich von Drygalski. 14. Band (Zoologie, 6. Band). Berlin: G. Reimer, 1913. Size 14 × 10¼, pp. vii. and 615. *Maps and Illustrations. Presented by the Imperial Foreign Office, Berlin.*

Arctic—Dutch Expeditions.

Fahrten und Forschungen der Holländer in den Polargebieten. Altholländische Berichte zur Geographie, Kultur- und Wirtschaftskunde der nördlichen Meere. Uebersetzt von P. Cronheim; mit einem Vorwort von Dr. H. Blink. (Quellen und Forschungen zur Erd- und Kulturkunde . . . herausgegeben von Dr. R. Stübe; Bd. 7.) Leipzig: G. Wigand, 1913. Size 10 × 7, pp. x. and 248. *Facsimile Maps and Illustrations. Price Mk.*18.

Spitzbergen—German Expedition. **Rüdiger.**

Die Sorge-Bai. Aus den Schicksalstagen der Schröder-Stranz-Expedition. Von Dr. Hermann Rüdiger. Leipzig: G. Reimer, 1913. Size 9½ × 6, pp. xii. and 215. *Map and Illustrations. Price M.*6.

A connected narrative of the distressing experiences of the Schröder-Stranz Expedition (cf. *Journal*, vol. 42, p. 402), by one of the survivors.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Coast reclamation. **Case.**

The use of vegetation for reclaiming tidal lands. By Gerald O. Case. London: St. Bride's Press, 1913. Size 7½ × 5, pp. 36. *Sketch-maps and Illustrations. Price 2s. net. Presented by the Publishers.*

Physiography. **Mill.**

The Realm of Nature: an outline of physiography. By Hugh Robert Mill. (2nd edit.) London: John Murray, 1913. Size 7½ × 5, pp. xii. and 404. *Maps and Diagrams. Price 5s. Presented by the Publisher.*

Zoogeography—Lions. **Pease.**

The book of the lion. By Sir Alfred E. Pease. London: J. Murray, 1913. Size 9 × 6, pp. xix. and 291. *Sketch-map and Illustrations. Presented by the Publisher.*

Presents the results of the writer's unrivalled experience as a hunter of lions and a keen student of their life-history and habits, about which there is, in his opinion, still much to be learnt. It is, of course, mostly concerned with Africa, but such questions as the general distribution of lions are discussed.

GENERAL.

British Empire—Bibliography. **Adams and others.**

Guide to the principal Parliamentary Papers relating to the Dominions, 1812–1911. Prepared by Margaret I. Adams, John Ewing, and James Munro. Edinburgh: Oliver & Boyd, 1913. Size 9 × 6, pp. xi. and 190. *Price 3s. 6d. net.*

Education—Methods. **Holtz.**

Principles and methods of teaching geography. By Frederic Holtz. New York (London: Macmillan & Co.), 1913. Size 8 × 5, pp. xii. and 359. *Sketch-maps. Price 5s. net. Presented by the Publishers.*

Educational—Practical work. **Fairgrieve.**

Notes and directions for the use of Philips' model set of surveying apparatus for schools. By J. Fairgrieve. London: G. Philip & Son, 1913. Size 8½ × 5½, pp. 14. *Illustrations. Price 6d. net. Presented by the Publishers.*

Geography—Text-book. **Herbertson.**

A handbook of geography. By Dr. A. J. Herbertson. Vol. 1. London: T. Nelson & Sons, [1911]. Size 7½ × 5, pp. xii. and 499. *Sketch-maps and Diagrams. Price 4s. 6d. Presented by the Publishers.*

See review in the December number, p. 565.

Geography—Text-book. **Herbertson.**

Commercial geography of the world. Part II. Outside the British Isles. By Dr. A. J. Herbertson. London: W. & R. Chambers, 1913. Size 7 × 5, pp. 313. *Sketch-map. Price 2s. 6d. Presented by the Publishers.*

Royal Society. **Royal Society.**

The celebration of the Two Hundred and Fiftieth Anniversary of the Royal Society of London, July 15–19, 1912. London: Royal Society, 1913. Size 10½ × 8, pp. iv. and 128. *Facsimile.* *Presented by the Royal Society.*

OLDER WORKS ADDED TO THE LIBRARY IN 1913.

A[skwith, Sir] G. R.—Venezuela and British Guiana Boundary Arbitration: synopsis of the principal events in Guiana. Size 18 × 22½. *Presented by Mr. James Macfarlan.* *London*, [1897].

Bonar, Dr. Horatius.—The desert of Sinai: notes of a spring journey from Cairo to Beersheba. Size 8 × 5. *London*, 1857.

Brett, William Henry.—Legends and myths of the aboriginal Indians of British Guiana. Size 8 × 5. *Illustrations.* *Presented by Mr. James Macfarlan.* *London*, [not dated].

Brockedon, William.—Journal of excursions in the Alps; the Pennine, Graian, Cottian, Rhetian, Lepontian, and Bernese. Size 7½ × 5. *Map.* *London*, 1833.

Cadalvène, Ed. de, and J. de Breuvery.—L'Egypte et la Nubie. 2 vols. Size 8½ × 5½. *Map.* *Also separate Atlas of Maps and Illustrations*, size 20 × 13. *Paris*, 1841.

Chabert, Joseph Bernard de.—Voyage fait par ordre du Roi en 1750 et 1751 dans l'Amérique Septentrionale, pour rectifier les cartes des côtes de l'Acadie, de l'Isle Royale, et de l'Isle de Terre-Neuve, et pour en fixer les principaux points par des observations astronomiques. Size 10 × 8. *Maps and Diagrams.* *Paris*, 1753.

Darlington, William M.—Christopher Gist's Journals, with historical, geographical, and ethnological notes, and biographies of his contemporaries. Size 10 × 6. *Facsimile Map.* *Cleveland, Ohio*, 1893.

Froidevaux, Henri.—Mémoires de L. A. Bellanger de l'Espinay, Vendomois, sur son voyage aux Indes Orientales (1670–1675). Size 10 × 6½. *Presented by M. Henri Froidevaux.* *Vendome*, 1895.

Haimann, Giuseppe.—Cirenaica (Tripolitania). 2ª edizione. Size 9½ × 6½. *Map, Plans, and Illustrations.* *Milan*, 1886.

Jackson, John.—Journey from India towards England, in the year 1797; by a route commonly called over-land, through countries not much frequented, and many of them hitherto unknown to Europeans, particularly between the rivers Euphrates and Tigris, through Curdistan, Diarbek, Armenia, and Natolia, in Asia; and through Romalia, Bulgaria, Wallachia, Transylvania, etc., in Europe. Size 8½ × 5½. *Illustrations.* *Presented by Sir Walter Filmore.* *London*, 1797.

Latrobe, C. J.—The Alpenstock; or sketches of Swiss scenery and manners, 1825–1826. 2nd edit. Size 7 × 4½. *Illustrations.* *London*, 1839.

Lavaysse, J. J. Dauxion.—Voyage aux Iles de Trinidad, de Tobago, de la Marguerite, et dans diverses parties de Vénézuéla dans l'Amérique méridionale. 2 vols. Size 8 × 5. *Maps.* *Paris*, 1813.

[Mazuchelli, Mrs. Nina E.]—The Indian Alps and how we crossed them. By a lady pioneer. Size 10½ × 7½. *Map and Illustrations.* *London*, 1876.

Raffenel, Anne.—Voyage dans l'Afrique Occidentale, 1843 et 1844. *Atlas only.* Size 13 × 10. *Map and Illustrations.* *Paris*, [1846].

—— —— Nouveau voyage dans le pays des nègres, suivi d'études sur la colonie du Sénégal, et de documents historiques géographiques et scientifiques. Vol. 2 [*completing the work*]. Size 10 × 6½. *Maps.* *Paris*, 1856.

Savigny, J. B. Henry, and A. Corréard.—Narrative of a voyage to Senegal in 1816. . . . Size 8½ × 5. *Illustrations.* *London*, 1818.

Scoresby, Rev. William.—My father; being records of the adventurous life of the late William Scoresby. Size 8 × 5. *Portrait.* *London*, 1851.

Scruggs, W. L.—The Venezuelan question. Size 9 × 6. *Presented by Mr. James Macfarlan.* *Atlanta*, 1896.

Simony, Dr. Friedrich.—Das Dachsteingebiet, ein geographisches Charakterbild aus den Oesterreichischen Nordalpen. Part 3 [*completing the work*]. Size 13½ × 10½. *Illustrations.* *Vienna*, 1895.

Tuckey, J. K.—An account of a voyage to establish a colony at Port Philip in Bass's Strait, on the South Coast of New South Wales, in H.M.S. *Calcutta* in the years 1802–04. Size 9 × 5½. *London*, 1805.

White, Captain William.—Journal of a voyage performed in the *Lion* Extra Indiaman from Madras to Columbo and Da Lagoa Bay, on the Eastern Coast of Africa (where the ship was condemned) in the year 1798. With some account of the manners and customs of the inhabitants of Da Lagoa Bay, and a vocabulary of the language. Size 11 × 8½. *Illustrations.* *London*, 1800.

France: Dépôt Général de la Guerre.—Memorial du Dépôt Général de la Guerre, Vol. 9. Nouvelle description géometrique de la France . . . Par E. Peytier. 3e partie. Size 11 × 9. *Maps.* *Paris*, 1853.

United Kingdom: Ordnance Survey.

Plans and photographs of Stonehenge, and of Turusachan in the Island of Lewis; with notes relating to the Druids, and sketches of cromlechs in Ireland. By Colonel Sir Henry James. Size 14 × 10½. *Plans and Illustrations.* *London*, 1867.

On the rectangular tangential projection of the sphere and spheroid, with tables of the quantities requisite for the construction of maps on that projection; and also for a map of the world on the scale of 10 miles to an inch. By the same. Size 21 × 14. *Map and Diagrams.* *London*, 1868.

Account of the methods and processes adopted for the production of the map of the Ordnance Survey of the United Kingdom. Drawn up by officers of Royal Engineers employed under Lieut.-General Sir Henry James. Revised in 1901 under the direction of Colonel Sir D. A. Johnston. Size 12½ × 10. *Specimen-maps, Illustrations, and Diagrams.* *London*, 1902.

Presented (except the last) by H.M. Ordnance Survey.

Victoria: Geological Survey.—Report of progress, by R. Brough Smyth; with reports on the geology, mineralogy, and physical structure of various parts of the colony. Size 11 × 7½. *Maps, Sections, and Illustrations. Presented by the Geological Survey of Victoria.* *Melbourne*, [1874].

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

British Isles—London. **Stanford.**

Stanford's New two-inch map of London and its environs. Municipal edition. Scale 1 : 31,680 or 2 inches to 1 stat. mile. Size 26 by 42 inches. *Price* 6*s.*—Stanford's Parliamentary map of London and its environs. Scale 1 : 31,680 or 2 inches to 1 stat. mile. Size 26 by 42 inches. London: Edward Stanford, Ltd., 1913. *Price* 6*s.* *Presented by the Publishers.*

Two coloured maps of London, one showing the Parliamentary and the other the Municipal divisions.

Central Europe. **K. u. K. Militärgeographisches Institut, Vienna.**

Generalkarte von Mitteleuropa. Scale 1 : 200,000 or 1 inch to 3·2 stat. miles. Sheets: 37°–42°, Scutari; 39°–42°, Skoplje; 40°–45°, Orsova. Size 22 by 17 inches. Vienna: K. u. K. Militärgeographisches Institut, 1912–13. *Price* 1.20*M. each sheet.*

France. **Ministre de l'Intérieur, Paris.**

Carte de la France dressée par ordre du Ministre de l'Intérieur. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheets: iv.–14, Morlaix; iv.–17, Quimper; viii.–19, Paimbœuf; ix.–33, Soustons; xii.–21, Mirebeau; xv.–23, Aigurande; xv.–25, Bourganeuf; xv.–27, Tulle; xvi.–7, St. Pol; xvi.–17, Orléans; xvi.–20, Vierzon; xviii.–17, Chateaurenard; xix.–13, Montmirail; xx.–9, Vervins; xx.–18, Montbard (Ouest); xx.–31, Bessèges; xxi.–24, Beaujeu; xxi.–26, Lyon (Sud-Ouest); xxiv.–17, Jussey; xxv.–23, Thonon-les-Bains. Size 11 by 15 inches. New editions. Paris: Hachette & Cie., 1913.

France. **Service Géographique de l'Armée.**

Carte de France et des Frontiers à 1 : 200,000 (1 inch to 3·2 stat. miles). (Type 1912.) Sheets: 10, Mézières; 11, Longwy; 18, Metz; 27, Nancy. Size 16 by 25 inches. New editions. Paris: Service Géographique de l'Armée, 1913. *Price* 2 *Fr. each sheet.*

Contours in light brown are given at intervals of 20 metres, but they are not numbered, and owing to shading intended to accentuate the relief, and other superimposed detail and colours, they are in many places hardly distinguishable. However, these new editions are, in some respects, improvements on the earlier impressions, and although they are far from satisfactory, the relief is certainly more effectively indicated. Forests are somewhat heavily shown in green, roads in red, railways and tramways in black. The map of which these sheets form part is important, as it is the only one published at the present time on a large scale on which any attempt has been made to show contours at all, with the exception of the new 1 : 50,000 survey, of which but few sheets have been issued.

Germany.

Karte der für Luftfahrzeuge verbotenen Zonen. Scale 1 : 3,484,800 or 1 inch to 55 stat. miles. Berlin: Simon Schropp, 1913.

A black and white sketch-map showing the areas in Germany over which it is forbidden to fly, and places where it is possible for aircraft to be housed. Military flying stations are not shown.

Iceland. **Bruun and Hansen.**

Kort over Island. Udarbejdet af Kaptajn Daniel Bruun og tegnet af Guide F. Hansen. Scale 1 : 850,000 or 1 inch to 13·4 stat. miles. Size 18 by 25 inches. Copenhagen: Gyldendalske Boghandel, 1913.

A roughly lithographed general map of Iceland printed in colours, showing boundary tracks, telegraph and telephone lines and stations, land surface features and other information, by symbols, the explanation of which is given in Icelandic and Danish.

Russia. **Ministry of Ways of Communication.**

Map of Railways, Waterways, and Roads of European Russia. [In Russian.] Scale 1 : 2,520,000 or 1 inch to 39·8 stat. miles. 6 sheets, each 21 by 25 inches. St. Petersburg: Ministry of Ways of Communications, 1913.

A new edition of an official map with information concerning means of communication by land and water throughout the Russian Empire brought up-to-date. It is clearly printed in colours, and by means of carefully selected symbols contains much that will be useful to all interested in the subject with which it deals.

Spain. **Deposito de la Guerra, Madrid.**

Mapa Militar Itinerario de España. Scale 1 : 200,000 or 1 inch to 3·15 stat. miles. Sheets: 45, Madrid. Size 19 by 25 inches. Madrid: Deposito de la Guerra, 1913.

A new edition of the Madrid sheet of an official map showing roads in red, railways black, and rivers blue. Roads are given by different breadth of lines, and numerous figures and letters appear, but there is no explanation of these on the sheet. No attempt has been made to show relief. The area included extends from about 30 to 50 miles round Madrid.

AFRICA.

Abyssinia. **Geographical Section, General Staff.**

Africa. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Abyssinia. Sheets: 66–K, Kirin, revised to March, 1912; 66–L, Walega, corrected to December, 1911; 66–P, Gorei, corrected to December, 1911; 67–M, Leka, corrected to December, 1911; 78–D, corrected to December, 1911. Size 18 by 25 inches. Published by the Geographical Section, General Staff. London agents: E. Stanford, Ltd., Sifton, Praed & Co., T. Fisher Unwin. *Price* 1*s.* 6*d. net each sheet. Presented by the Director of Military Operations.*

Africa. **Unstead and Taylor.**

Philips' Comparative Series of Wall Atlases. Edited by J. F. Unstead, M.A., D.SC., and E. G. R. Taylor, B.SC., with explanatory handbook for teachers. Africa: Scale 1 : 9,000,000 or 1 inch to 150 stat. miles. Size 43 by 33 inches. London: George Philip & Son, Ltd., 1913. *Price* 27*s.* 6*d. the set. Presented by the Publishers.*

This is the fourth series of these "Comparative Wall Atlases," those previously issued being Europe, British Isles, and Asia. As before there are eight coloured

diagrammatic maps on one scale: (1) Relief of land and communications; (2) Political; (3) Summer climate; (4) Winter climate; (5) Temperature; (6) Natural vegetation; (7) Economic; (8) Density of population. The arrangement has much to commend it from an educational point of view, although there may be some room for improvement in detail in respect to the system of colouring, such, for instance, as the relief and rainfall maps, the former of which are somewhat crude and the latter would be much more effective in tints of blue only instead of brown and blue. It is a pity that the 30th meridian is still shown as passing through the middle of Lake Albert Edward with Ruwenzori to the east, since this has for a long time been proved not to be the case. As with the others, these eight maps are all mounted on linen, with brass eyelets for hanging, and folded in a case. Considering the amount of research and work represented, the price is remarkably low.

Egyptian Sudan. **Geographical Section, General Staff.**

Africa. Scale 1: 250,000 or 1 inch to 3·9 stat. miles. Egyptian Sudan. Sheets: 55–B, Khartoum, corrections to October, 1912; 66–G, Keili, revised to March, 1912; 66–H, Beni Shangul, corrected to December, 1911. Size 18 by 25 inches. Published by the Geographical Section, General Staff, War Office, London. Agents: E. Stanford, Ltd.; Sifton, Praed & Co.; T. Fisher Unwin. *Price* 1*s.* 6*d. net each sheet. Presented by the Director of Military Operations.*

Provisional issues of revised editions of these three sheets. They are printed in black only, and indicated approximately the relief by broken horizontal form lines. Full explanation is given of the conventional signs employed, and there are useful notes on the character of the country and the authorities from which the sheets have been compiled.

Egyptian Sudan. **Survey Office, Khartoum.**

Africa. Scale 1: 250,000 or 1 inch to 3·9 stat. miles. Sheets 35–K, Abu Tabag; 35–M, Kosha; 35–P, J. Abu Dueim; 65–G, Fishik; 66–M, Hillet Nuer. Size 18 by 25 inches. Printed on linen. Khartoum: Survey Office, 1913. *Price* 10 *P.T. each sheet. Presented by the Director of Surveys, Khartum.*

French Equatorial Africa. **Delingette.**

Carte Générale de l'Afrique Équatoriale Française publiée par ordre de M. le Gouverneur Général M. Merlin, dressée et dessinée par G. Delingette sous la direction de M. l'Administrateur Bruel, Chef du Service Géographique de l'A. E. F. Scale 1: 1,000,000 or 1 inch to 15·8 stat. miles. Sheet 5. Size 23 by 38 inches. Paris: Augustin Challamel, 1913.

This sheet completes the map of French Equatorial Africa, the first three sheets of which were noticed in the *Geographical Journal* for May, 1910. It extends from 4° to 9° N. lat. and from 20° to 28° E. long., and embraces the upper Ubangi river and its tributaries, with the adjacent part of the Bahr el Ghazel province of the Anglo-Egyptian Sudan. It has been compiled from the latest route traverses, and shows water blue and routes in red.

AMERICA.

Canada. **Dept. of the Interior, Ottawa.**

Sectional Map of Canada. Scale 1: 190,080 or 1 inch to 3 stat. miles. Sheets: 11, Yale, British Columbia, revised to March 26, 1913; 15, Lethbridge, Alberta, revised to February 18, 1913; 21, Turtle mountain, Manitoba and Saskatchewan, revised to April 22, 1913; 61, Lytton, British Colombia, revised to April 21, 1913; 65, McLeod, Alberta, revised on May 15, 1913; 68, Swiftcurrent, Saskatchewan, revised to July 11, 1913; 71, Brandon, Manitoba, revised to May 10, 1913; 119, Regina, revised to September 3, 1913; 120, Qu'Appelle, Saskatchewan, revised to June 13, 1913; 163, Donald, revised to September 5, 1913; 264, Brazeau, Alberta, revised to June 16, 1913; 266, Ribstone Creek, revised to July 15, 1913; 313, Brule, Alberta, revised to May 30, 1913; 320, Carrot River, revised to September 5, 1913; 465, Pelican, revised to October 13, 1913; 466, Landels, Alberta, revised to September 30, 1913. Size 17 by 31 inches. Ottawa: Department of the Interior, Topographical Surveys Branch, 1913. *Presented by the Department of the Interior, Ottawa.*

Canada. **Dept. of Militia and Defence, Ottawa.**

Topographic Map of Canada. Scale 1: 63,360 or 1 inch to 1 stat. mile. Sheets: 44, Chatham, Ontario, 18 by 25 inches; 46, Essex, Ontario, 18 by 25 inches; 48, Windsor, Ontario, 17 by 13 inches; 49, Amherstburg, Ontario, 17 by 13 inches;

50, Pelee, Ontario, 23 by 15 inches; 51, Perch, Ontario, 18 by 25 inches. Published by the Geographical Section, General Staff, War Office, 1913. London agents: E. Stanford, Ltd., Sifton Praed & Co., T. Fisher Unwin. *Price 2s. net per sheet. Presented by the Director of Military Operations.*

Canada. **Dept. of Mines, Geological Survey.**

Geological Survey of Canada. Map 40–A, Bighorn Coal Basin between Saskatchewan and Brazeau Rivers, Alberta. Topography, reconnaissance. Scale 1:125,000 or 1 inch to 1·97 stat. miles. 1911. Size 18 by 16 inches. Map 94 A, Taku Arm, Atlin District, B.C. Geology, preliminary map. Scale 1: 316,800 or 1 inch to 5 stat. miles. 1913. Size 12 by 8 inches. Ottawa: Department of Mines, Geological Survey. *Presented by the Department of Mines, Canadian Geological Survey.*

Canada—British Columbia. **Dept. of the Interior, Ottawa.**

British Columbia Railway Belt. Scale 1: 190,080 or 1 inch to 3 stat. miles. Map showing disposition of lands prepared under the direction of F. C. C. Lynch, Superintendent of Railway Lands. Corrected to September, 1913. Sheets: Kamloops and Lytton; Sicamous; Port Moody and Yale. Size 29 by 30 inches. Ottawa: Department of the Interior, 1913. *Presented by the Department of the Interior, Ottawa.*

These three sheets give, by means of colours and symbols, limits of (1) Homesteads patented and homesteads entered for and unpatented; (2) Sales, special grants, mining lands sales; (3) Lands disposed of by Provincial Government; (4) Forest reserves and parks; (5) Timber berths; (6) Grazing leases; (7) Indian reserves. In addition, information is given concerning means of communication, post offices, etc.

Canada—British Columbia. **Dept. of Lands, B.C.**

Pre-emptor's maps: Sheet 1, Fort George, scale 1 inch to 3 stat. miles, revised to March 15, 1913; Sheet 2, Nechako, scale 1 inch to 3 stat. miles, revised to April 15, 1913; Sheet 3, Stuart Lake, scale 1 inch to 3 stat. miles, revised to June 15, 1913; Sheet 4, Bulkley, scale 1 inch to 3 stat. miles, revised to May 15, 1913; Sheet 5, Peace River, scale 1 inch to 4 stat. miles, revised to May 1, 1913; Sheet 6, Chilcotin, scale 1 inch to 3 stat. miles, revised to April 15, 1913; Sheet 7, Lillooet, scale 1 inch to 3 stat. miles, revised to August 15, 1913; Sheet 8, Lac La Hâche, scale 1 inch to 3·5 stat. miles, revised to July 1, 1913. Victoria, B.C.: Department of Lands, 1913. *Presented by H. Otto Frind, Esq.*

A series of diagrammatic maps extending from the southern part of British Columbia along the Fraser river valley, and thence to the Peace river, and west along the new railway line to its terminus on the Pacific at Prince Rupert. Land open to pre-emption is coloured a brick-red, and squares, with numbers, show the limits of the areas. The maps also give the various Land Recording Districts.

Canada—British Columbia. **Dept. of Lands, B.C.**

Northern Territory. Scale 1; 1,125,000 or inch to 17·7 stat. miles, 22 by 36 inches, 1912.—East and West Kootenay. Scale 1: 500,000 or 1 inch to 7·8 stat. miles, 30 by 26 inches, 1911.—Yale District and portion of adjacent districts. Scale 1: 500,000 or 1 inch to 7·8 stat. miles, 39 by 26 inches, 1912.—Portions of New Westminster District and Vancouver Island. Scale 1: 205,920 or 1 inch to 3·25 stat. miles, 26 by 36 inches, 1912. Portion of Coast and Rupert Districts. Scale 1: 180,000 or 1 inch to 2·8 stat. miles, 26 by 34 inches, 1912.—South-Western Districts. Scale 1; 760,320, or 1 inch to 12 stat. miles, 25 by 32 inches, 1912.—Sketch-map of Crown Lands Range and Coast District, Bulkley River. Scale 1: 63,360 or 1 inch to 1 stat mile, 38 by 25 inches.—Portion of the west coast of Vancouver Island. Scale 1: 190,080 or 1 inch to 3 stat. miles, 24 by 34 inches, 1911. Victoria, B.C.: Department of Lands. *Presented by H. Otto Frind, Esq.*

A set of coloured maps, somewhat rough in appearance, showing railways and trails, land district boundaries, timber areas, Indian reserves, mining divisions, and other information useful to intending emigrants.

Canada—British Columbia. **Surveyor-General's Office, Victoria, B.C.**

British Columbia. Scale 1: 126,720 or 1 inch to 2 stat. miles. Sheets: Cranbrook, revised to August, 1912; Nelson; Rossland, revised to January 1, 1912. Each 35 by 23 inches. Victoria, B.C.: Surveyor-General's Office, 1912. *Presented by H. Otto Frind, Esq.*

Three outline sheets in black and white. The part of British Columbia included is that in the neighbourhood of Kootenay and lower Arrow lakes adjacent to the United States boundary. Boundaries of claims and other land areas are marked out and numbered.

United States. **Dept. of the Interior, Washington.**

Panoramic view of the Crater Lake National Park, Oregon. Scale 1 : 62,500 or 1·01 inch to 1 stat. mile. Size 19 by 17 inches. Washington : Department of the Interior, [1913]. *Presented by the Department of the Interior, Washington.*

A diagrammatic sketch, showing the relief in a bold style by a combination of shading and tints of green, yellow, and reddish-brown, accentuated by illumination from the west.

United States. **Rand, McNally & Co.**

Rand-McNally Indexed County and Township Pocket Maps: Missouri, scale 1 : 1,013,760 or 1 inch to 16 stat. miles, size 19 by 26 inches; New Jersey, scale 1 : 443,520 or 1 inch to 7 stat. miles, size 26 by 19 inches. New editions. Chicago and New York : Rand, McNally & Co., 1913.

AUSTRALASIA.

Australia. **Commonwealth Government.**

Map of the Commonwealth of Australia. Scale 1 : 2,027,520 or 1 inch to 32 stat. miles. Compiled, drawn, and printed for the Commonwealth Government at the Department of Lands, Sydney, N.S.W., from data supplied by the several States, and published by the authority of the Honourable the Minister of State for Home Affairs. 8 sheets, each 44 by 28 inches. Melbourne, 1912. *Presented by the Government of the Commonwealth of Australia.*

A large map of Australia in black and white, prepared from the latest information. The tops and general directions only of the mountain ranges are shown by short vertical hachures. The map has no great merit as a cartographical production, but will be very useful for reference. Railways, telegraph lines, roads, and tracks are given; and amongst other information is a dotted line showing the artesian areas. As an inset is given a diagram of the world showing the relative position of Australia to other countries, and the principal steamship routes. There are also tables of the area and population of the states and territories, and the latitudes and longitudes of their capitals.

New South Wales. **Dept. of Lands, Sydney.**

New South Wales, including Lord Howe Island. Scale 1 : 1,000,000 or 1 inch to 15·78 stat. miles. 4 sheets, each 21 by 27 inches. Sydney : Department of Lands, 1913. *Presented by the Department of Lands, Sydney.*

A useful general map in black and white, prepared from the latest information, and based upon the trigonometrical survey of the state and astronomical determinations. The direction of mountain ranges only is given; but railways, main roads, and territorial boundaries are shown in some detail. The map has evidently been drawn first on a much larger scale, and somewhat over-reduced by photography, with the result that many of the smaller place-names can only be read with difficulty.

New South Wales. **Dept. of Lands, Sydney.**

New South Wales, showing local government shires and municipalities. Scale 1 : 1,000,000 or 15·78 stat. miles. 4 sheets, each 21 by 28 inches. Sydney : Department of Lands, 1910. *Presented by the Department of Lands, Sydney.*

A black and white map, with names of shires and their boundaries in red, and municipalities in green.

South Australia. **Survey Dept., Adelaide**

Map of the southern portion of South Australia. Scale 1 : 1,000,000 or 1 inch to 15·78 stat. miles. Size 40 by 28 inches. Adelaide : Survey Department, 1912. *Presented by the Surveyor-General of South Australia.*

An interesting map, showing by means of different colours, in addition to general information in black, (1) land sold and leased; (2) estates repurchased and reclaimed lands; (3) lands open to application; (4) lands surveyed (but not offered), under survey, and to be surveyed; (5) village districts.

Victoria. **Dept. of Lands and Survey, Melbourne.**

Map of Victoria. Scale 1 : 506,880 or 1 inch to 8 stat. miles. 4 sheets, each 20 by 30 inches, 1913. Melbourne: Dept. of Lands and Survey. *Presented by the Department of Lands and Survey, Melbourne.*

This is a black-and-white map with the hillwork in the old "hairy caterpillar" style. Its outline and physical features are evidently taken from a much earlier map, but, nevertheless, it is useful, especially for railways and other information.

Victoria. **Dept. of Lands and Survey, Melbourne.**

Map of Victoria, showing Counties, Parishes, and Railways. Scale 1 : 506,880 or 1 inch to 8 stat. miles. 4 sheets, each 20 by 30 inches. Melbourne: Dept. of Lands and Survey, 1911. *Presented by the Department of Lands and Survey, Melbourne.*

The basis of this map is the same as that above, but counties, parishes, and railways are shown in red. Along the railways distances from Melbourne are given in figures.

Victoria. **Dept. of Lands and Survey, Melbourne.**

Victoria. Scale 1 : 1,013,760 or 1 inch to 16 stat. miles. Size 24 by 34 inches. Melbourne: Dept. of Lands and Survey, 1910. *Presented by the Department of Lands and Survey, Melbourne.*

A one-sheet general map in black and white, reduced (somewhat overmuch) from one on a larger scale.

Victoria. **Dept. of Lands and Survey, Melbourne.**

Victoria classified according to its productiveness. Scale 1 : 1,013,760 or 1 inch to 16 stat. miles. Size 14 by 34 inches. Melbourne: Dept. of Lands and Survey. *Presented by the Department of Lands and Survey, Melbourne.*

Gives, by means of nine different colours and symbols, the location and limits of wheat-growing land, grazing land, agricultural land for growing root crops and dairying, land suitable for fruit-growing, vineyards, irrigation areas, partly irrigated areas, forest and timber reserves, and butter factories. It also shows railways, working and under construction, heights in figures, and approximate rainfall.

Victoria. **Dept. of Lands and Survey, Melbourne.**

Geodetic Survey of Victoria. Scale 1 : 126,720 or 1 inch to 2 stat miles. Division S. Size 17 by 38 inches, 1905.—Triangulation of Victoria. Scale 1 : 1,013,760; [N.D.].—Borung. Scale 1 : 126,720. 2 sheets, each 23 by 34 inches [N.D.].—Goulbourn Irrigation Scheme. Scale 1 : 126,720. 2 sheets, each 26 by 28 inches; [1913].—Murray Irrigation Scheme. Scale 1 : 126,720, [1913]. [Size 21 by 28 inches. —Township of Wonthaggi. Scale 1 : 4800 or 13·2 inches to 1 stat. mile. Size 32 by 28 inches; 1911.—Melbourne and Suburbs. Scale 1 : 7920 or 8 inches to 1 stat. mile. 7 sheets. 1910. Melbourne and Suburbs. Scale 1 : 15,840 or 4 inches to 1 stat. mile. Size 30 by 40 inches; 1910,—Bendigo. Scale 1 : 3168 or 20 inches to 1 stat. mile. Sheet 2. Size 40 by 26 inches; 1910. Melbourne: Department of Lands and Survey. *Presented by the Department of Lands and Survey, Melbourne.*

Victoria. **Dept. of Lands and Survey, Melbourne.**

Tourists' Maps: Australian Alps, Mount Buffalo, scale 1 : 506,880 or 1 inch to 8 stat. miles, size 19 by 14 inches; Buffalo National Park, scale 1 : 39,600 or 1·6 inch. to stat. mile, 1911, size 20 by 18 inches; Dandenong Ranges, scale 1 : 63,360 or 1 inch to 1 stat. mile, 1911, size 13 by 12 inches; Daylesford and district, scale 1 : 80,000 or 1 inch to 1·3 stat. miles, 1910, size 13 by 17 inches; Grampians, Halls Gap and surroundings, scale 1 : 48,000 or 1·3 inch to 1 stat. mile, 1910, size 19 by 13 inches; Sale, Bairnsdale, Gippsland lakes, Buchan caves, scale 1 : 253,440 or 1 inch to 4 stat. miles, 1912, size 16 by 23 inches; Warburton, Mount Baw Baw, Walhalla, scale 1 : 190,080 or 1 inch to 3 stat. miles, size 15 by 23 inches; Werribee Gorge, scale 1 : 15,840 or 4 inches to 1 stat. mile, 1908, size 10 by 13 inches. Melbourne: Department of Lands and Survey. *Presented by the Department of Lands and Survey, Melbourne.*

A set of roughly executed maps of districts of special interest to tourists, with road tracks. Descriptive letterpress appears on the back, with photographic reproductions of scenery of the locality concerned.

ARCTIC REGIONS.

Spitsbergen. **Bruce and Mathieson.**

Map of Prince Charles Foreland from surveys by W. S. Bruce, LL.D., F.R.S.E., and J. Mathieson, F.R.S.G.S., assisted by J. V. Burn Murdoch, R. N. Rudmose Brown, D.SC., E. A. Miller, A. Peach, B.SC., A. Geddes, and G. Kerr. Scale 1 : 140,000 or 1 inch to 2·2 stat. miles. Size 26 by 16 inches. Published with the support of H.S.H. the Prince of Monaco. Paris, 1913. *Presented by W. S. Bruce, Esq., LL.D., F.R.S.E.*

The *Geographical Journal* for August, 1908, contained a preliminary map of Prince Charles Foreland, with a paper, prepared from the surveys of Dr. W. S. Bruce carried out in 1906–7. The surveys were continued during another visit in 1909, with the result that an excellent map of the island has been completed, and published with the support of H.S.H., the Prince of Monaco. The survey consisted of theodolite triangulation, from measured bases, with astronomically determined positions. Relief is shown by contours which, after the first 100, are at 100-metre intervals. On ground less than 100 metres in altitude in some parts the second contour is numbered 30 and in others 50, and it is impossible to say which is correct, but in any case it would have been preferable, for the general effect of the relief, if these intermediate contours had been shown by faint dotted lines, or by some means that distinguished them from the others at 100 metres apart. Taken altogether this is a most creditable piece of survey work, and probably there is no other land within the arctic circle surveyed so thoroughly.

GENERAL.

World. **Instituto Geografico Militar, Buenos Aires.**

International Map of the World. Scale 1 : 1,000,000 or 1 inch to 15·8 stat. miles. Sheets : América del Sud. Sud G 21, Corrientes ; Sud H 21, Concorda ; Sud I 21, Buenos Aires. Size 18 by 22 inches. Buenos Aires : Instituto Geografico Militar, 1911.

These are provisional issues of the first three sheets of the International Map of the World to be published by the Instituto Geografico Militar, Buenos Aires ; and on the whole they are creditable productions. There are no great altitudes on either of the sheets, consequently, according to the scheme of colour tints adopted for the map, shades of green cover the Buenos Aires sheet entirely, and by far the greater part of the others. There is an explanation of the conventional signs employed, but no information is given as to the data from which the sheets have been compiled, which must vary considerably as to degree of accuracy, since in some parts only very rough maps exist, while others have been accurately surveyed.

World. **Stanford.**

Stanford's New Library Chart of the World. Equatorial Scale 1 : 25,550,000 or 1 inch to 403 stat. miles. 4 sheets, each 25 by 36 inches. London : Edward Stanford, Ltd., 1913. *Price, in sheets,* 14*s.* *Presented by the Publishers.*

A useful general map of the world, showing the territorial divisions in a bold style by different colours. No attempt has been made to indicate relief, and the absence of hill-shading certainly adds clearness, and gives greater legibility to place-names. The map is intended for the walls of libraries and offices, where it will doubtless be useful. There is no consistency about railways, for while some are shown in Africa, the important transcontinental lines across Europe, Asia, and America are not given. There are also one or two other matters that might be attended to in a new edition ; for instance, Spitsbergen is here spelt in the old style, "Spitzbergen," which has long been shown to be wrong, and discontinued. Peary Land is still shown as a separate island instead of a peninsula, and in Africa the name French Congo appears where there should be French Equatorial Africa.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, from November 1 to 29, 1913. *Presented by the Hydrographer, Admiralty.*

New Charts—No. 1054, Madagascar (Plans in Madagascar : Baie Ambavanibé Baies Ampanasina and Lotsoïna, Baie de Rigny (Ambavarane), 3*s.* 3781 to 3796, China, Yang-tse kiang : Ichang to Chung king (sheets 1 to 16), 2*s. each.* 2453,

British Columbia: Browning entrance to Prince Rupert harbour, 4*s*. **New Editions**—2675*c*, English channel: English channel—eastern sheet: Portsmouth to the Thames (Plan: River Seine), 4*s*. 1895, England, south coast: Dungeness to the Thames, including Dover strait, 4*s*. 2397*a*, Scotland, east coast: Scotland, north and east coasts, with the Orkneys and Shetland, south sheet (Plans: Loch Fleet, Cromarty and Inverness firths, Banff and Macduff, river Tay, Leith and Granton, Head of the Firth of Forth, Fraserburgh, Peterhead, Aberdeen, Montrose, Stonehaven, Arbroath, 3*s*. 3261, North sea: Elbe river, outer light-vessel to Brunsbüttelkoog (Plans: Cuxhaven road, Kaiser Wilhelm canal entrance, Brunsbüttelkoog), 5*s*. 2612, France, north coast: Fécamp to Boulogne (Plans: Fécamp, Tréport), 3*s*. 3414, Mediterranean, France: Approaches to Marseille. (Plan: Port de Bouc), 3*s*. 194, Mediterranean: Malta and Gozo islands, 3*s*. 646, Africa, east coast: Lourenço Marques, 3*s*. 145, Arabian sea; Plans on Makran coast: Khor Rabij (Plan added: Jashk bay, 2*s*. 3218, China, Canton river: Pe-kiang or North river, Sam shui to Shao chau fu (Plans: Lienchau river, sketch of First Rapid), 3*s*. 1759, China, east coast: Wen chau bay to Kue shan islands (Plan added: Shih phu road and harbour), 3*s*. 3032, China: The upper Yangtse kiang, sheet 6: Kwei chau fu to Chung king fu (Plan of Chung kiang fu on this sheet erased), 3*s*. 288, Russian Tartary: Ussuri bay (Plan: Andreeva bay), 3*s*. 3198, Russian Tartary: Askold island to Cape Povorotni, 3*s*. 1695*b*, Australia: Bass strait, western sheet. (Plan: Refuge cove), 3*s*. 1047, Australia, north-west coast: Cape Ford to Buccaneer archipelago, 5*s*. 1621, Australia, east coast: Port Jackson to Port Stephens, 4*s*. 1695*a*, Australia, south coast: Bass strait, eastern sheet, 3*s*. 2614, New Zealand, North island: Kaipara harbour, 3*s*. 134, Pacific ocean, New Hebrides islands: Port Patteson, Port Olry, Hayter bay, Dillon bay, Port Narevin (Walter bay), Espiègle and Malua (Olemam) bays, Dives bay, Lakarere, Picot bay, Ringdove anchorage, Torres or Vava islands, Vi Paka anchorage, Anuda or Cherry island, 3*s*. 1751, South America, Uruguay: North shore of the Rio de la Plata, Sauce point to Martin Garcia island (Plan: Sauce harbour), 3*s*. 354, Bay of Fundy: River Petitcodiac and Cumberland basin, 3*s*. 1970, Prince Edward island: Murray harbour, 2*s*.

(*J. D. Potter, Agent.*)

Atlantic, North, and Mediterranean. **Meteorological Office.**

Monthly Meteorological charts of the North Atlantic and Mediterranean, December, 1913. London: Meteorological Office, 1913. *Price 6d. each. Presented by the Meteorological Office.*

Atlantic, North. **U.S. Hydrographic Office.**

Pilot chart of the North Atlantic Ocean, November, 1913. Washington: U.S. Hydrographic Office, 1913. *Presented by the U.S. Hydrographic Office.*

Atlantic, South. **U.S. Hydrographic Office.**

Pilot chart of the South Atlantic Ocean, December, 1913, January and February, 1914. Washington: U.S. Hydrographic Office, 1913. *Presented by the U.S. Hydrographic Office.*

Indian Ocean. **Meteorological Office.**

Monthly meteorological charts of the Indian Ocean, December, 1913. London: Meteorological Office, 1913. *Price 6d. each. Presented by the Meteorological Office.*

Indian Ocean. **U.S. Hydrographic Office.**

Pilot chart of the Indian Ocean, December, 1913. Washington: U.S. Hydrographic Office, 1913. *Presented by the U.S. Hydrographic Office.*

Norway. **Norges Geografiske Opmaaling.**

Kystkarter: No. 76, Fra Raftsund og Stokkmarknes til Hooden og Sortlandsund; 78, Fra Hooden til Langenes og Risöysund; 88, Fra Hekkingen til Kvalsund; 230, Tysfjorden og Ofotfjorden. Christiania: Norges Geografiske Opmaaling, 1913. *Presented by the Norwegian Geographical Institute.*

Pacific, North. **U.S. Hydrographic Office.**

Pilot charts of the North Pacific Ocean, December, 1913. Washington: U.S. Hydrographic, Office, 1913. *Presented by the U.S. Hydrographic Office.*

Pacific, South. **U.S. Hydrographic Office.**

Pilot chart of the South Pacific Ocean, December, 1913, January and February, 1914. Washington: U.S. Hydrographic Office, 1913. *Presented by the U.S. Hydrographic Office.*

Russian Charts. **Ministry of Marine, St. Petersburg.**

Russian Hydrographic Charts, Nos. 755, Gulf of Bothnia, Approach to Abo; 840, White sea, Cape Ponomarev to Sosnovi Point; 842, Sea of Okhotsk, Okhotsk harbour and entrances to Kutui and Ulya rivers; 856, Black sea, Sukhum to Batum. St. Petersburg: Hydrographic Department, Ministry of Marine, 1912–13. *Presented by the Ministry of Marine, St. Petersburg.*

Spitsbergen. **Norges Geografiske Opmaaling.**

Spitsbergen. Farvand og ankerpladser paa Vest-og Nordkysten. Christiania: Norges Geografiske Opmaaling, 1913. *Presented by the Norwegian Geographical Institute.*

PHOTOGRAPHS.

Himalayas. **Sella.**

Twenty-two photographs of the Himalayas taken in the neighbourhood of Kangchenjunga by Sr. Vittorio Sella. *Presented by the Right Hon. Earl Curzon of Kedleston,* G.C.S.I., G.C.I.E.

Signor V. Sella accompanied Mr. D. W. Freshfield and Prof. E. Garwood on their expedition to Sikkim in 1899, and it was during this journey that these photographs were taken. Signor Sella has gained a world-wide reputation for his excellent photographs, specially of mountain scenery; and these are all good specimens of his work. They measure 7½ by 9½ inches.

(1) Kangchenjunga and Pandim from Gangtok; (2) Camp at Lachen; (3) Rhododendrons in Zemu valley; (4) Gentians in Zemu valley; (5) Siniolchum from below Thé La; (6) *Leontopodium Alpinum* in Zemu valley; (7) Freshfield's camp behind the moraine of Zemu glacier; (8) Kangchenjunga, north side; (9) Kangchenjunga from near the Jonsong La; (10) Camp below Jonsong La; (11) Northern spur of Kangchenjunga; (12) Jannu from above Kambachen; (13) Jannu from near Choonjerma La; (14) Everest group from Choonjerma La; (15) Freshfield's camp at Jongri; (16) Pandim; (17) Kangchenjunga and Guicha La; (18) Kabru from near Jongri; (19) Kabru from Pamionchi; (20) Interior of temple of Pemionchi; (21) Kangchenjunga from Zemu; (22) Kangchenjunga and Guicha La.

New Zealand. **Frind.**

Sixteen photographs of North island, New Zealand, taken by H. Otto Frind, Esq. *Presented by H. Otto Frind, Esq.*

A set of postcard photographs of this interesting volcanic region, measuring 5½ by 3½ inches. The titles are as follows:—

(1) Lake Roto Aira from Mount Tongariro; (2) Mount Tongariro and Katetahi blowhole from the north; (3) Mounts Tongariro and Ngauruhoe from the north; (4, 6, and 7) Ketetahi blowhole, Mount Tongariro; (5) Ketetahi hot springs; (8 and 9) Mount Nganruhoe from Oturere crater; (10) Mount Ngauruhoe from 19-mile peg, Waiouru-Tokaanu road; (11) Waihoheun mountain hut; (12) Mount Ruapehu from Waihoheun mountain hut; (13) Mount Egmont from Mount Ruapehu; (14) Hot Lake and Mount Paratetaitonga from Mount Ruapehu; (15 and 16) Mongaehuehue glacier on Mount Ruapehu.

North-East Frontier of India. **Gunter.**

Thirty-one photographs taken by Major C. P. Gunter, R.E., while in charge of the Dibang Exploration Survey, 1912-1913. *Presented by Major C. P. Gunter,* R.E.

These photographs are specially important as the region traversed is so little known. They represent the scenery well, and though small (3½ by 4½ inches) many of them are remarkably good.

(1) Nizamghat where the Dibang debouches into the plains; (2) The Maya cliff and Dibang gorge 3 miles above Nizamghat; (3) Rapids, Dibang river near Ahsun

stream; (4) Group of Mishmis at Imbolin village; (5) Political officer and Mishmis at Imbolin village; (6) Bridge-making over the Ithun river; (7 and 8) Mishmi suspension bridge at Etalin over Tangon river; (9) Junction of the Tangon and Emra rivers; (10) Below junction of Tangon and Dri rivers; (11) Above junction of Tangon and Dri rivers; (12) Bridging the Matun river below Mipi village; (13) Camp at Mipi; (14) Tibetan bridge above Mipi; (15) Tibetan village of Mipi; (16) Young wheat and storehouses, Mipi; (17 and 18) Tibetans at Mipi; (19) Running the range-finder traverse up the Adzon river; (20) Adzon river; (21) Adzon river below lakes; (22) Looking up Adzon river from lakes; (23) Looking down Adzon river from lakes; (24) At the lakes, Adzon river; (25) Mishmi village of Azunli on Dri river; (26) Rope bridge over the Ange river; (27) Lower cascade of Detza falls on the Dri river; (28) Toe of snow avalanche, Dri river; (29) Where the Dri river falls 1500 feet in 1½ miles; (30) End of the range-finder traverse up-river, at 10,000 feet elevation, Aguia pass in distance; (31) End of Dri traverse, looking down-stream.

Vancouver Island. **Frind.**

Twenty-one photographs of the West Coast of Vancouver Island, taken by H. Otto Frind, Esq. *Presented by H. Otto Frind, Esq.*

A set of small but interesting photographs, measuring 5½ by 3¼ inches. Some of the sea views are specially good.

(1) Carmanah lighthouse; (2) Pachena lighthouse; (3) Bamfield Cable Station; (4) Cape Beale; (5 and 6) Surf at Cape Beale; (7) Amphitrite lighthouse; (8) Cape Beale, view north from lighthouse; (9 and 10) Ucluelet, Indian village; (11) Wreck bay; (12) Surf-boat landing at Estevan; (13) Road to lighthouse and steamer landing at Estevan point; (14) Hesquiat bay; (15) Sunrise at Hesquiat bay; (16) Long bay and beach; (17) C.P.R. s.s. *Tees* and Long bay; (18) Fishing off coast; (19) False creek in 1909, looking south; (20 and 21) Scow building at Rat Portage mills, False creek.

West Indies. **Alcock.**

West Indies scenery. Twenty-two water-colour sketches made on voyages to and from the West Indies, by Frederick Alcock, F.R.G.S. With Historical and Topographical Notes by H. J. B. Ward, B.A. London and Newcastle-on-Tyne: Andrew Reid & Co., Ltd.

A series of reproductions of water-colour sketches. The author, who is already well known from his "South American Scenery," has caught the general effect of the colouring remarkably well on the whole, although, some of the views are decidedly better than others.

(1) A North Atlantic sunset; (2) St. Graco church, Pedro point, St. Michael's; (3) Needham point, Bridgetown, Barbados; (4) Carenage, Trinidad; (5) Savannah and Government House, Trinidad; (6) "Blue Basin," near Port of Spain, Trinidad; (7) A glimpse of Grenada; (8) A Grenadine landscape; (9) Picturesque Kingstown, St. Vincent; (10) Entrance to Castries harbour; (11) Castries, St. Lucia; (12) Roseau, from the sea; (13) Plymouth, the capital of Montserrat; (14) "La Popa" hill, Cartagena; (15) Blue mountains, Jamaica; (16) Seaside, Priestman's river, Jamaica; (17) Kingston's Fountain Head; (18) Forden river, Dracabessa; (19) A banana farm, Jamaica; (20) Fading day; (21) Entrance to Santiago, Cuba; (22) Q.M.S.P. Co.'s *Arcadia*, homeward bound.

N.B.—It would greatly add to the value of the collection of Photographs which have been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

BRITISH ANTARCTIC EXPEDITION
1910-13

SKETCH MAP
to illustrate the paper by

RAYMOND E. PRIESTLEY
ON

THE WORK OF THE NORTHERN PARTY

These plans are principally from the surveys of the Expedition, but must be considered as only provisional.

Published by the Royal Geographical Society

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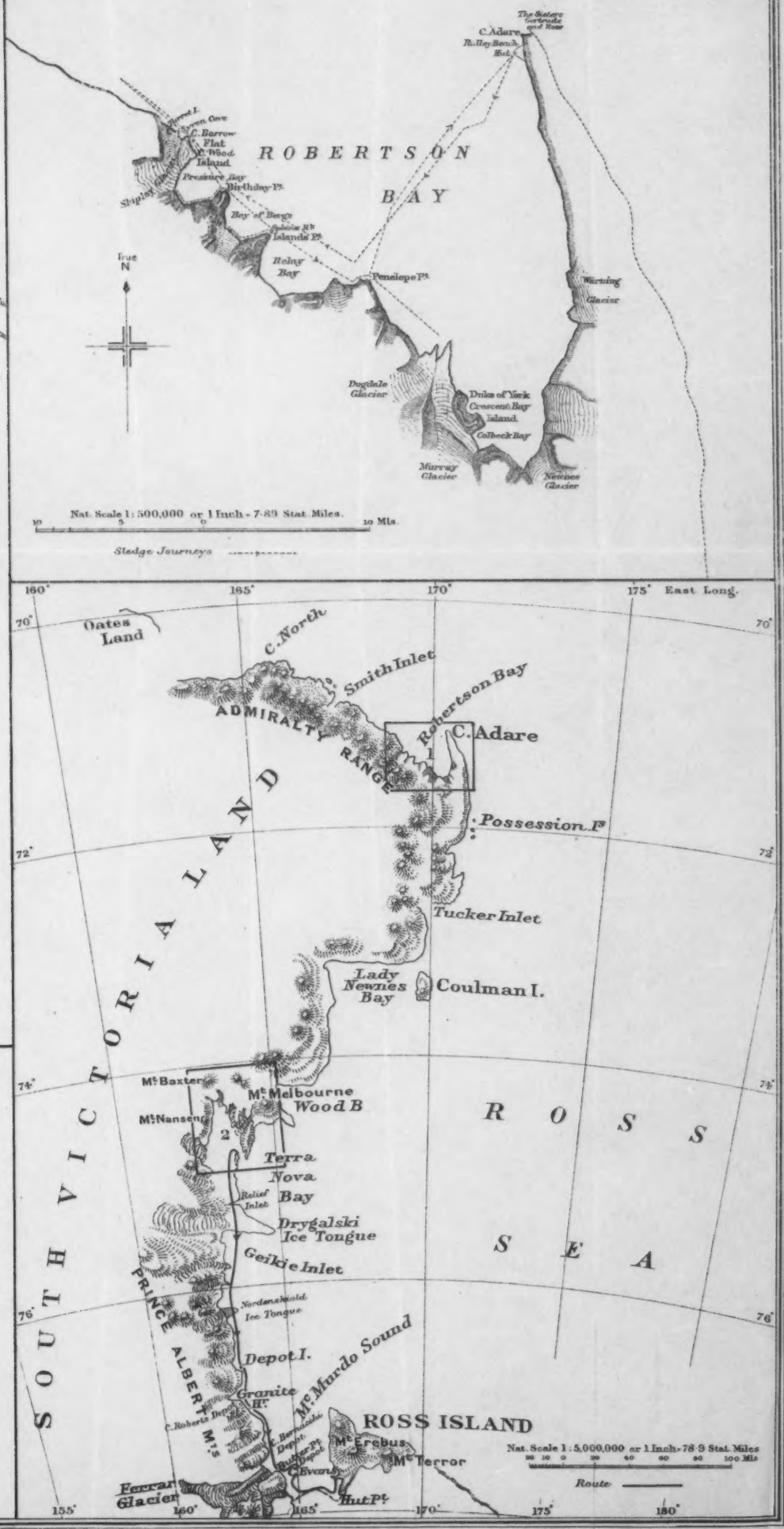

BRITISH ANTARCTIC EXPEDITION
PRIESTLEY